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NEW DIRECTIONS IN ARCHITECTURAL RESEARCH

Proceedings of
The 1990 Canadian Symposium on
Architectural Research
May 10-12, 1990
The University of Calgary

Edited by:

James A. Love and
Tang G. Lee

The views and conclusions expressed and the recommendations made in this report are entirely those of the authors and should not be construed as expressing the opinions of Alberta Municipal Affairs.

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FOREWORD

The project documented in this report received funding under the Innovative Housing Grants Program of Alberta Municipal Affairs. The Innovative Housing Grants Program is intended to encourage and assist housing research and development which will reduce housing costs, improve the quality and performance of dwelling units and subdivisions, or increase the long term viability and competitiveness of Alberta's housing industry.

The Program offers assistance to builders, developers, consulting firms, professionals, industry groups, building products manufacturers, municipal governments, educational institutions, non-profit groups and individuals. At this time, priority areas for investigation include building design, construction technology, energy conservation, site and subdivision design, site servicing technology, residential building product development or improvement and information technology.

As the type of project and level of resources vary from applicant to applicant, the resulting documents are also varied. Comments and suggestions on this report are welcome. Please send comments or requests for further information to:

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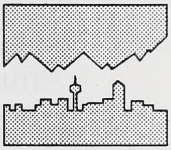

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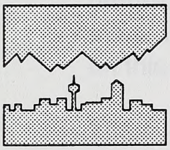

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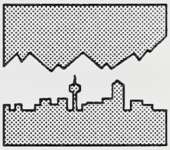
Preface

The organization of this symposium was spurred by the efforts of the Royal Architectural Institute of Canada, under the presidency of Dr. Esmail Baniassad, Dean of the Faculty of Architecture of the Technical University of Nova Scotia, to promote the development of architectural research in Canada. The future of architectural research is promising as design gains increasing recognition as having a legitimate knowledge base and requiring skills that are unique. The program of the Calgary symposium was formulated to contribute to the development of the intellectual framework for architectural design and research, based on this view.



The symposium was jointly sponsored by
- the Royal Architectural Institute of Canada
- the Alberta Association of Architects
- Alberta Municipal Affairs
- Employment and Immigration Canada
- The University of Calgary
- the Alberta Building Envelope Council
- the Southern Alberta Institute of Technology
- the Northern Alberta Institute of Technology

Alberta Municipal Affairs and Employment and Immigration Canada made significant financial contributions to the operation of the symposium. Ian Bazley, of Alberta Municipal Affairs, provided useful comments on the housing portion of the program. Tim Kehoe, Director of Research and Education with the Royal Architectural Institute of Canada, also made helpful suggestions regarding the program.

The symposium benefitted from the efforts of diligent staff who served for various periods of time on the project. Barbara Stewart acted as project manager, while Rosalie Grant, Dale Palmer, Corina Simon, Laura Spence supported the symposium and related activities in a number of ways - arranging participant travel and accommodation, preparation of the transcript, and dealing with data analysis being but a few of their contributions. Katina Despotopoulos developed the graphic formats for the various materials used during the symposium and in the final report.

INTRODUCTION: ARCHITECTURAL RESEARCH IN THE POST-MODERN ERA

James Love and Tang Lee

The field of architecture is undergoing a significant stage of development based on the recognition that the central activity of architecture, form-making at the scale of buildings, is as worthy as the central activities of other professions and is, like them, a vocation based on distinctive knowledge and skills. The failure to recognize this has led to a dysfunction in architectural research. As was noted in the theme statement issued prior to the meeting in Calgary, much of the research that has been done on buildings and building design is not readily usable by architects. It has been suggested that research has actually reduced the quality of architectural design, because "designers are left to make their own links with research by assimilating results and quantification rules, and to evaluate them...without guidance on priorities or pattern of application. The designer's field thus becomes more complex and less structured." One remedy that has been suggested is the use of integrative demonstration projects in addition to verbal research reports focussing on isolated questions [1].

Approaches to architectural research have paralleled changes in critical attitudes toward architecture. In the early 19th century, critics began to call for a new style, independent of historic references, the argument being that architectural style should reflect social and technological change. Rapid progress in the "mechanical arts" further spurred the demands of some critics for a corresponding pace of stylistic development [2]. In the 20th century, the pressure for new approaches to architecture grew as architecture was perceived to be lacking the scientifically-developed knowledge and working methods employed in fields such as medicine. Architects looked as far afield as engineering and the social sciences to find new operational models. The conceptual foundations of architectural decision-making have been re-evaluated to a degree surpassing any other field because architecture, to a greater degree than any other field, deals with both cultural and technological matters. After recently passing through phases in which "structural determinism" [3] and energy efficient design were seen to be primary form generators, and person-environment studies a primary preoccupation, architecture is returning to its roots. Cultural aspects of form-making are increasingly seen to be the paramount concern in architecture. Form-making is increasingly accepted as a discipline in its own right. Architectural precedents are seen to be a legitimate source of ideas in architectural design, just as literature is enriched by ties to earlier literature. The recognition of the centrality of form-making in architecture was the basis for the formulation of the program of the Calgary symposium on architectural research.

The organizers of the 1990 symposium examined the organization and the proceedings of two earlier meetings - the Edinburgh conference of 1972 [4] and the Ann Arbor conference of 1982 [5] - in formulating the program for the Calgary meeting. While the Edinburgh meeting had the theme "The Application of Architectural Research to Practice," the participants were drawn solely from academic and research institutions. The presentations at the Edinburgh symposium reflected the concerns of the times. Models of the design process were proposed and discussed. While most of these models included components such as "cultural context" and "user requirements," the comments of the participants revealed a dominant concern for building performance in isolation from matters having to do with culture and the process of form-making. A comment by one of the participants regarding housing in India is revealing: "The magnitude of the problem can be illustrated by the fact that, when communities were presented with three room houses, families chose to use one of these rooms exclusively for religious ceremonies" [6]. In other words, the legitimacy of user values does not appear to have been accepted when they differed from those of the researcher. The researchers seemed to have been primarily concerned with "cost-benefit" without recognizing that many of the most significant values, choices, and activities of human beings have nothing to do with cost-benefit.

This single-minded "building performance" approach to design and design research has had significant negative consequences for both industry and users. Canadian natives have been housed in settlements for which the primary generator of form has been efficient servicing based on conventional water supply and sewage treatment systems. The resulting placement of homes at a proximity alien to the culture has aggravated social problems. Even from a cost-benefit viewpoint, it is essential that cultural issues be considered. For example, Poitras and Duff give the example of an enterprise that was recognized as "Company of the Year" in Quebec for its development of a housing system based on polyhedra made of structural panels [7]. Although the units produced to date are considered to be of high quality in terms of fabrication, and offer advantages in building where access is difficult, they have not been well-accepted because they fail to convey the image of a home that is acceptable to the public.

The participants in the Ann Arbor conference also seem to have been drawn almost exclusively from academia. Technological and person-environment relations research were the primary topics, and few papers dealt with building form in concrete terms. A few of the authors recognized the importance of cultural issues in architectural design and research, as is evidenced by the following statement:

> What we need at this time is a new view of the relation between design and research. The effort to turn architecture into science has just

> about run its course. A view of architectural research which is closer to scholarship is emerging..but only partially formed....Whether you define architecture as the making of places, the enclosing of space, [or] the transmission of meaning in our culture ...we now know that it can be informed by research but not formed by it [8].

The view reflected in the above quote appears not to have been the dominant one, as the editor provides the following overview, "In summary, one might say that the intellectual tradition of architectural education emphasizes precedent and adaptation rather than knowledge development...only a handful of schools have moved away from the tradition of professional design education toward the prevalent university mode of knowledge generation" [9]. This statement would seem to support the view of Joroff and Morse that architecture should adopt the approach used by medicine and engineering: "the notion of 'research as teacher of teachers' has gradually come to supplement the idea that teachers learn primarily from engaging in professional practice....This evolution from practice-oriented to research-oriented instruction seems to have progressed much more slowly in the field of architecture" [10].

Over the past ten years, Donald Schon has challenged current approaches to "research as a teacher of teachers" and the "technical rationality" model of professional practice as the basis of professional education: "I have become convinced that universities are not devoted to the production and distribution of fundamental knowledge in general. They are institutions committed, for the most part, to a *particular* [Schon's italics] epistemology, a view of knowledge that fosters selective inattention to practical competence and professional artistry" [11]. Schon defines technical rationality as the view that "professional activity consists [of] instrumental problem-solving made rigorous by the application of scientific theory and technique" [12]. He argues "with this emphasis on problem-solving, we ignore problem *setting* [Schon's italics], the process by which we define the decision to be made, the ends to be achieved, the means which may be chosen" [13]. Schon continues "In real-world practice, the problems do not present themselves to the practitioner as givens. They must be constructed from the materials of problematic situations which are puzzling, troubling and uncertain.... Problem setting is a process in which, interactively, we *name* the things to which we will attend and *frame* the context in which we will attend to them [Schon's italics]." Even in the case of the manipulation of the physical environment, "a problem...may escape the categories of applied science because it presents itself as unique or unstable.... Technical Rationality depends upon agreement about ends... when ends are confused and conflicting, there is as yet no 'problem' to solve. A conflict of ends cannot be resolved by the use of techniques derived from applied research. It is through the non-technical process of framing the problematic situation that we may organize and clarify both the ends to be achieved and the means of achieving them." The influence of Technical Rationality has been that "engineering schools have become schools of physics and mathematics; medical schools have become schools of biological science; business schools have become schools of finite mathematics" [14].

Contrary to the Technical Rationality school, exemplified by Simon, who argues that all professional thought is basically the same [15], Schon argues that the various professions have different means of dealing with the situations they confront, although similarities in the kinds of action may be found. For instance, all professions have ways of "framing" problems, but the "framing" used by architects is very different from the "framing" used by psychologists. He has coined the term "reflection-in-action" to refer to the process by which practicing professionals develop solutions. Schon suggests the following areas of research related to the concept of reflective practice [16]:

1. The ways in which practitioners frame tasks
2. The tasks themselves, including description and analysis of exemplars
3. Methods of enquiry and conceptual frameworks
4. The process of reflection-in-action

Such research should show how design can be more effectively informed by new models of architectural research.

The themes for the Calgary symposium were chosen to address subjects that were given insufficient attention at the preceding conferences:

1. The nature of architectural research in a post-modern setting
2. The legitimacy and potential of design and design practice as forms of research
3. The relationship between research and practice

In other sessions, priorities for architectural research in the 90's and strategies for developing architectural research were discussed.

For the purposes of the symposium, it was proposed that architectural research be defined as enquiry regarding the generation of the form of buildings, encompassing cultural, technological, environmental, and economic considerations. Special sessions were organized on housing; the discussions related to this building type provoked a number of fruitful debates. A conscious effort was made to ensure that participation by individuals in practice, in academia, and in other institutions was balanced, although all the practitioners who were invited had some experience with research.

The currents of post-modern views of the role of science and culture in relation to design were felt at the symposium. The great need for development of a more developed intellectual framework for architectural thought was argued by several of the speakers. This framework is seen to be an important requirement in ensuring that the general enterprise of architectural research is productive. This will necessitate the development of new ways of relating forms of enquiry, from the scientific to the scholarly, to the process of architectural design. Some speakers expressed a concern that architectural research and practice should be treated within a broader multidisciplinary framework. However, it can be argued that a stronger conceptual framework in architecture is essential to the enhancement of such undertakings. One of the recurring debates during the symposium addressed architecture as manipulation of physical systems versus architecture as a form of expression and communication. These differences have to be reconciled, and that reconciliation should be an important focus of architectural research.

Notes

1. Hillier, B., J. Musgrove, and P. O'Sullivan, "Knowledge and Design," in *Developments in Design Methodology,* N. Cross, Editor. 1984, John Wiley: New York. pp. 245-264.

2. Collins, P., *Changing Ideals in Modern Architecture.* 1965, London: Faber and Faber. pp. 128-146.

3. Erickson, E., "Arthur Erickson," in *By Their Own Design,* A. Suckle, Editor. 1980, Whitney Library of Design: New York. pp. 11-18.

4. Robertson, C. and J. Gibbons, ed. *The Application of Architectural Research to Practice.* 1973, The Commonwealth Foundation: London.

5. Snyder, J.C., ed. *Architectural Research.* Environmental Design Series, ed. R.P. Dober. Vol. 6. 1984, Van Nostrand Reinhold: New York.

6. Prakesh, A., , in *The Application of Architectural Research to Practice,* C. Robertson and J. Gibbons, Editor. 1973, The Commonwealth Foundation: London. p. 63.

7. Poitras, A. and J. Duff, *Technological Innovation in Residential Construction and Production of Housing Using Non-traditional Methods.* 1988, Société d'habitation du Québec, Montréal.

8. Anonymous, in *Architectural Research,* J.C. Snyder, Editor. Environmental Design Series, ed. R.P. Dober. 1984, Van Nostrand Reinhold: New York. p. 42.

9. Snyder. p. 7.

10. Joroff, M.L. and S.J. Morse, "A Proposed Framework for Architectural Research," in *Architectural Research,* J.C. Snyder, Editor. 1984, Van Nostrand Reinhold: New York. p. 16.

11. Schon, D.A., *The Reflective Practitioner: How Professionals Think in Action.* 1982, New York: Basic Books. p. vii.

12. Schon. p. 21.

13. Schon. pp. 40-41.

14. Brooks, H., in Schon. p. 40.

15. Simon, H.A., *The Sciences of the Artificial.* 1969, Cambridge, MA: MIT Press. pp. 55-56.

16. Schon. p. 309.

ARCHITECTURAL RESEARCH: DIRECTIONS FOR THE FUTURE

Esmail Baniassad

There is so much to discuss in the area of conceptual issues that some sense of the "geography" of issues must be established. I will begin with two concerns. The first is related to the theme statement:

> It has been argued that much of research that has been done on buildings and building design is not readily usable by architects; some have claimed that research has actually reduced the quality of architectural design, because 'designers are left to make their own links with research by assimilating results and quantification rules, and to evaluate them...without guidance on priorities or pattern of application. The designer's field thus becomes more complex and less structured.' [1]

Hillier, Musgrove, and O'Sullivan's paper was written in 1972. Many, more recent, analyses are entirely out of date, but this statement is still a penetrating observation. That, itself, is a measure of the problem that we are facing. The root cause of the problem that Hillier, Musgrove and O'Sullivan identified still remains untouched. We have found it very elusive. I will devote most of my discussion to that root cause.

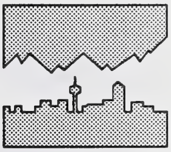
In attempting to secure funding for research and to make architecture a legitimate field of research, we face a couple of major problems. One of them is a distorting effect that our efforts may have on the very nature of architecture. The other is the effort that members of our discipline, be it in education or in practice, have to invest to "get to first base" in achieving comparability of standing with other disciplines that are recognized in the research culture of this country.

It seems that, on both counts, we are treading a difficult path. The second problem is more obvious, because we spend much time in fragmented efforts to make a case to whoever is willing to hear us. Those of us in academia arrange many meetings with university authorities. Research groups outside the universities have many meetings with officials of various ministries and other organizations. It seems that we are all having to work in a piecemeal way. There is no funding structure or organization through which we can operate the same way as groups such as engineers who are, in some respects, most comparable to us.

We would like to see the establishment of a structure that helps us to gain more momentum, to get more efficiency out of our individual efforts, so that the individual efforts begin to take on two characteristics. We have to advance beyond the current situation for architectural researchers, which can be compared with climbing a mountain all the way from the base camp every time. That is to say, when someone makes a case to a ministry or to the administration of a university for recognition of a research program, that recognition should remain in the memory of the system so that the next initiative can actually build from the latest "camp." This is very important. It is a natural process in other disciplines, but in architecture we do not have that. Therefore, every such effort is time-consuming and fragmented.

The riskier aspect of efforts to develop architectural research I address secondly, because it is less tangible. I do not assume that we share common views on this second point, as I think we do on the first . To explain the risk, I must first discuss the current state of the discipline of architecture.

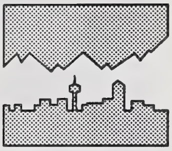
Our object of study, be it in research or education, is architecture. It is common to mistake this, the object of our study, with the subjects that serve as instruments for this study. The difference is a very important one. The object of our study has a very long history, a distinguished history. Architecture is recognized as a legitimate development of human civilization. It is incontestable as such. The history of human civilization, essentially, is a history of development of tools, be it manual tools or intellectual tools. Intellectual tools enable people to join forces through the mechanism of building a subject rather than working on isolated fragments of knowledge. This involves definition of concepts that allow communication between researchers. In the literature disseminated prior to the symposium, there were many references to the dilemma of fragmented efforts, and we hear many references to the same fragmentation every time architectural research is discussed. In terms of the development of instruments for the study of architecture, we are, more or less, in the prehistory of our discipline. I do not mean to be harsh or dramatic. I say "more or less in the pre-history of our discipline" because our efforts do not display many of the necessary signs of having a subject and they bear few of the fruits of having a subject.



I dwell on this for two reasons. Firstly, I think this lack of intellectual development may give us some indication of the root cause of our problems in developing organized research in architecture. Secondly, I think that it may help us in understanding a couple of dilemmas that we face.

One of these dilemmas is the distorting effect our fragmented attempts to initiate research may have on the very object of our research, which is architecture. This distorting effect particularly concerns me as an individual. I do not want to hunt for support only to find that I have funding to study something foreign to my interests, so that I have to abandon the support and return to my real interest. This distorting effect threatens the very essence, the very nature, the very integrity of our object of study. Schools are particularly susceptible to this, and have suffered tremendously from this.

I will now discuss, more specifically, the problems leading me to claim that subjects of study in architecture are still fixed in their pre-history. It seems to



me that we have not yet come to terms with important dualities, even though these dualities have been thoroughly examined in other disciplines. These are dualities such as the relationship between tradition and originality. When we work, whether in common practice or in research, we are working somewhere in a spectrum between tradition and originality, between convention and invention, between routine and research. It is important to have a clear idea of our position with regard to these dualities. Many of our debates and presuppositions regarding architecture suggest to me that we see these dualities as opposites. Quite often, we fail to appreciate the importance of convention to an activity that may be an inventive one. These dualities show up in my work as the relationship between what one may call the ordinary and the extraordinary. Quite often we treat these two as though they are disjointed. There is a major quality difference between the ordinary and the extraordinary. It seems to me, and this view may not be shared, that the extraordinary arises out of the ordinary, that the extraordinary dwells in the ordinary. I believe that the ordinary and the extraordinary have a symbiotic relationship, and that understanding the relationship between them is essential to the conduct of any intelligent action. I can point to many instances of resolution of this duality in many other fields. For example, Einstein viewed scientific language as an extension of ordinary language [2]. Of course, this is not a simple issue. Treatment of scientific language as an extension of ordinary language is based on recognition of the relationship between tradition and originality, routine and research, ordinary and extraordinary. The same connections have to be explored in the discipline of architecture.

A critical decision must be made. Each researcher must decide whether the practice of architecture can serve as a fertile ground for both the topics of research and the conduct of research, or whether the roots of topics for research are extra-disciplinary. I believe the question must be resolved before one can go very far. If you assume my point of view about the relationship between any of the polarities I mentioned, then what you find is that you must examine the ordinary activities associated with architecture in order to do extraordinary things. In other words, directions for research and topics for research are not going to come from outside the discipline, but from the messy, muddy, confused, disorderly practice of architecture.

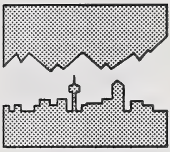
In my work, I find that the assumption about the grounds for research being disciplinary or extra-disciplinary is extremely important. That is to say, whatever I do in research in architecture arises out of architecture. It does not come from outside of architecture. The concepts with which I work, if I borrow them from other disciplines, have to be defined in terms of architecture before I can construct anything on them that is related to architecture. The problems that I address, even though they might have been signalled to me by having been identified in some other discipline, have to be identified in architectural terms before I can do anything about them.

It seems to me that one of the distorting effects on architecture since the 1960's has been the tendency of many of our colleagues to take issues from other disciplines and tried to conduct what they call research on those issues on extra-architectural grounds. I believe we have not made a reasonable contribution to the state of human knowledge by doing that kind of work. I also believe that we have taken many notions from other disciplines and adopted them, lock, stock, and barrel, without putting them through the filter of architecture. If what I am claiming is true at all, this is essential before we can claim to be conducting research in architecture. We may be conducting research in cognitive sciences by testing applications in architecture; that is an entirely different matter. I think that fails to constitute research in architecture. We may conduct research on the technology of curtain walls and applying the results to architecture. That is entirely different from architectural research, although it may be quite legitimate in its own right. It has been very difficult to conduct research in architecture, partly because we have found it difficult to define the disciplinary elements of architecture.

Now we come to another point, which I think we could settle at this gathering. Is architecture, as an object of study, a kind of object that lends itself to research? If it is not, then we should not waste our time chasing a ghost. We should be very happy with our object and go about it in other ways. That question, I think, has yet to be resolved. I have faith, rather than a reasoned argument, that architecture is an object that can be researched. I could not present a complete argument, but I could take a lot of time trying to make an argument. It would not be a very clear argument, because we, as a profession, have not yet carried that debate to its resolution. The best sign that we failed to achieve a resolution is that, in our schools of architecture, we have yet to start any course of architectural education by some clear, simple, shared statement about the elements of our discipline. It seems to me that architecture, even from that standpoint, is still at a stage that I would best call the intuitive phase.

The intuitive phase of a field is very interesting. It is a phase where every individual, depending on talent and possibilities, does whatever they can about the object of their study. Art, by and large, operates at that level. There is nothing wrong with this, but our efforts to develop programs for architectural research are based on a claim that we have developed beyond the intuitive phase of our field. I believe that we have not. One of the best modes of architectural education is still apprenticeship. This is because we have not developed beyond the intuitive phase of our field.

Architectural education suffers because, we typically attempt to simulate the intuitive activity which happens very effectively in offices: one person communicating with another, one person looking at what someone else is doing and learning by observation. The challenge in formal education is that there has to be a subject, and that subject has to be conveyable in public terms. We have not yet achieved that. There are other signs that we are in the intuitive phase of our field. One of these signs is our impatience with alternative positions about architectural education. We have fights about this. It is not because we are petulant. It is intellectual impatience, because there is no structure within which we can accommodate alternatives.



Another sign that we are still in the intuitive phase of our field is the state of two sets of issues. One set of issues pertains to concepts that we believe are essential to our work. There has been little development of these concepts for a very long time. These concepts include intention, function, and operation. We should not be too embarrassed - there are other disciplines in which important ideas have not been developed. According to Northrop Frye, the idea of genre in literary criticism has, more or less, been left where Aristotle left it [3]. However, such gaps in development do point to a certain lack of maturity in a discipline.

The state of another set of issues is also very telling. These pertain to subjects in architecture, to return to my opening comments. These subjects, in terms of which we set out to study architecture, are, by and large, still non-architectural.

The first one is history, which is still close to the stage of being a chronicle of events, rather than a discipline. This chronicle tends to constitute the substance of what we call "survey" courses. There is nothing inherently wrong with such chronicles, but they are not history, and they are certainly not the history of architecture. The best indication that architectural history is still underdeveloped is the dependence on the recollection of events. This argument regarding development is general. For instance, it can be applied to languages. One should be able to discuss aspects of a language other than the elements of its vocabulary. We still teach the history of architecture in terms of an anecdotal recounting of events. The chronological ordering of events is the lowest type of order or structure one could imagine about history. By and large, we have not gone beyond it.

The second area is technology. By and large, these subjects - construction, structures, and environmental control - are taught as extra-architectural subjects. They are still being taught as a discipline in their own right. They are not being taught as a subject in architecture. If the object of study is architecture, all of these subjects have to be redeveloped in the key of architecture. We have a lot of work to do in schools of architecture to accomplish this.

Finally, of course, one must consider design, one of the most underdeveloped, but central, parts of our curriculum.

I stress the subjects of architecture because, by and large, whenever we discuss research in architecture, we seem to neglect the most effective advance we could make in research in architecture - that is, in the subjects of study of architecture, the tools of study, and the tools of research. These are, perhaps, the responsibility of the schools, but the schools have not developed these tools. Our failure to develop these tools has led to a constant laboriousness in architectural education. At the other end of that process, in architectural practice, we want to conduct research. Research is a difficult enough; architectural research is bound to be frustrating because every time we complete an investigation, it is very difficult to know whether we have moved closer to the object of our study or further from it. Some of us who are succeeding in getting grants to do research may, in fact, be moving so far from architecture that we find ourselves in another field altogether. This problem interests us tremendously at the Technical University of Nova Scotia, because we are putting a lot of energy into research and we are anxious to know that we are not developing the wrong way. We believe that our discussions should emphasize architecture as the subject and the instrument of the study. The other part of research, that is to say, research in technology and construction, is fairly well-developed because it shares a lot with other technologies in terms of research techniques. My firm belief is that, until we have developed effective instruments for the study of architecture and for architectural study, our efforts will remain fragmented. Each effort may succeed in its own right, but, collectively, they will not form a basis from which we can rise to higher and higher levels. Architectural research is doomed to a ceiling on its quality if we operate at this very basic level; there are major issues in architecture that will be ignored because dealing with the complexity of the discipline is the only way for us to deal with more complex problems in architecture.

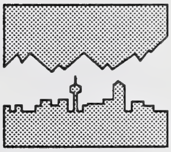
Some of the failures in architectural practice have to do with the lack of a structure from which one can rise to tackle more complex problems. In fragmented efforts, it is impossible to rise very high; each of us has to go all the way from the beginning to the end.

Notes

1. Hillier, B., J. Musgrove, and P. O'Sullivan, "Knowledge and Design", in *Developments in Design Methodology,* N. Cross, Editor. 1984, John Wiley: New York. pp. 245-264.

2. Einstein, A., *The Common Language of Science,* in *Ideas and Opinions,* C. Seelig, Editor. 1954, Crown: New York. pp. 335-341.

3. Frye, N., *Anatomy of Criticism.* 1957, Princeton, NJ: Princeton University Press.



PANEL: CONCEPTUAL ISSUES IN ARCHITECTURAL RESEARCH

Stanley Stein, Eric Haldenby, and David Roth

Dr. Stein: Let me start with a statement by Michael Benedikt that reflects the essence of my position with regard to the gaps between architectural research, architectural practice and architectural theory:

> Architecture...begins with the simplest choices about, and manipulations of, the physical environment, and ends with the location of individual reflective consciousness in the context of advanced cultural production. Architecture contains in its multi-level systems of constraints and freedoms an evolving map of an evolving, lived world. As such, its ties to the best science, literature, engineering, music and art of the era are to be actively pursued [1].

The statement is slightly pretentious, but I think it is very insightful. My statement will be an explication of that remark.

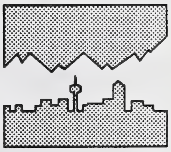
The problem that exists today in architectural research arises, in part, out of the research culture that has developed as part of our modern culture. I am going to give a post-modern critique of this culture, but a post-modern critique which is based on critical theory rather than the usual deconstructive analysis. Critical theory was developed in Germany by scholars often referred to as the Frankfurt School, its proponent being Jurgen Habermas [2]. I am going to use his approach to demonstrate some of the problems with the idea of research in architecture.

Habermas argues that one of the crucial presuppositions of modern thought, a presupposition that is incorrect or "distorted," is the idea that all knowledge must be based on an absolute foundation; that foundation being science. The goal of modernism, for Habermas, is the reduction of all knowledge and all rationality to scientific knowledge and scientific rationality. In this framework, all legitimate advances in knowledge and rationality will be achieved through the mechanism of science.

This, to use Habermas' phrase "distorted and scientistic" view of knowledge and rationality associated with modernism has created an overly restrictive view of the architectural research. According to Habermas, those who presuppose this distorted and scientistic approach fail to appreciate two crucial features of human knowledge and rationality [3]. The first significant feature is that all knowledge and rationality are connected to human practice and interests; they do not exist independently of those interests and practices. The second significant feature is the failure to perceive that there is more than one kind of human interest and, correspondingly, more than one kind of human knowledge and rationality. I will discuss two kinds of knowledge and rationality other than science. It may be argued that there are others. Science deals with one particular human interest, the manipulation of the physical environment. According to that point of view, we, and the architectural artifacts we create, are just part of the physical environment, just physical things among other physical things - part of the physical world. When we look at the universe and ourselves in that way, we employ the concepts of "observation", "generalization," and "causal relationship." We take an external point of view. If we restrict knowledge and rationality to that point of view, then they are arbitrarily restricted, and a large part of our world is excluded from consideration. This is what Habermas means when he uses the word "scientistic" to refer to this restricted notion of the physical and biological sciences, the social sciences, and knowledge in general.

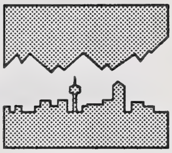
Habermas argues that there are other kinds of interests and, correspondingly, other types of knowledge and other types of rationality. If research and conceptual frameworks are restricted to the first type of interest, only the manipulation of the physical environment will be addressed. This is what we begin with in architecture: the manipulation of a physical environment. What will be left out is the essential result - that is, "the location of individual reflective consciousness in the context of advanced cultural production" [1]. In order to consider this latter concern, which is essential to architecture and to architectural research, we have to deal with other human interests, other types of rationality, and other types of knowledge.

I will discuss two other human interests that Habermas has identified. One is communicative. This second interest involves understanding ourselves acting in concert with others as apart of a common community, within a common social and historical tradition. This understanding is not observational, it is not causal, it is not behavioral, and it is not functional. It is interpretive, meaningful, participatory, and normative. It involves an understanding of ourselves as meaningful entities participating in common cultural traditions, rather than an understanding of ourselves as physical entities



The way to advance this second kind of knowledge and second kind of rationality is not through science. At least, it is not through science as science has been perceived by many modern thinkers such as the proponents of the International Style. Architecture must go beyond the mere manipulation of the physical environment, and involve us as meaningful creatures having a culture, traditions, interests, and an understanding of each other. Post-modern architecture reflects this fact. Indeed, a good deal of post-modern architecture has returned to tradition and rebelled against the idea that there is a universal abstract foundation for architecture. I think that popular objections to modern architecture in Great Britain and the rest of the world, exemplified by Prince Charles' appeal to tradition, arise in part from the realization that architecture must go beyond the "scientistic" view.

Is this enough? Some, including Habermas, have argued that this second interest, the interest in understanding each other and living together in a social community with a tradition and interpreting that tradition is, in itself, not enough. It leads to a static, conservative, and non-creative situation. Another element is required, a third aspect of knowledge and a third kind of rationality - the critical aspect.



Not only do we have an interest in understanding our situation, our society, and our fellows, we have an interest in modifying ourselves and our society. We have an interest in critical evaluation. This critical understanding, this critical knowledge, and this critical rationality correspond to a third type of interest, an interest in emancipation - an interest in eliminating those elements of our society and those elements of our traditions which are oppressive. Therefore, we have to evolve, we have to critique, we have to progress, and we have to create. This includes a continuing critique of our society. Here also, we are not involved in observation, we are not involved in description, we are not involved in causation. We are involved in interpretation, participation, and critique, as well as modification and progress.

What does all of this have to do with architectural research? It demonstrates that architectural research has to go beyond a mere scientific model. It has to consider other aspects of our understanding. It has to encompass interpretive sociology. It has to consider literature and art. It has to deal with politics. It has to deal with morality. By arbitrarily restricting research to scientific research, we eliminate those aspects of scholarship that are essential to understanding architecture as a reflection of our consciousness in the context of advanced cultural production - an evolving and progressive cultural production. To bridge the gap between architectural research as merely a technocratic means to an end and as a reflection of ourselves as progressive social beings, we have to give up the modernistic idea that architectural research must be based purely on the scientific model.

Prof. Haldenby: Canadian Schools of Architecture have, in recent years, come to support significant levels of research activity. In this essay I will discuss some of the reasons why the shift to research has, for the moment at least, weakened the links between the schools and the practicing profession. My perspective is that of an architectural educator and scholar, but one who is profoundly concerned about the future of the profession. The discussion here aims to show that research is not only the crux of the relationship between education and practice, but also that it is fundamental to the development of architectural culture in this country.

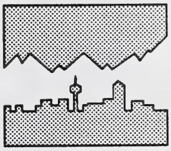
Let it first be clear that, by architectural research, I do not mean simply the development, dissemination, and application of scientific or technical information related to design and construction, for more fact is not what architecture needs. Some thirty years ago, C. Wright Mills laid out parameters for thought in the social sciences in a landmark essay. His comments suggest what should be sought from research in general and, more particularly, how research might serve the design professions.

> It is not only information that they need - in this Age of Fact, information often dominates their capacities to assimilate it. It is not only the skills of reason that they need - although their struggles to acquire these often exhaust their limited moral energy.
>
> What they need, and what they feel they need, is a quality of mind that will help them to use information and to develop reason in order to achieve lucid summations of what is going on in the world and of what may be happening within themselves. It is this quality, I am going to contend, that journalists and scholars, artists and publics, scientists and editors are coming to expect of what might be called the sociological imagination [4].

At present, one would search in vain for evidence of the operation of such imagination in the architectural profession. The schools of architecture have shown limited intellectual leadership, and practitioners very little sustained will, with respect to the critical examination of the structure and relationships of the field with our society and culture.

Adding to the problem is the fact that the relationship between the Canadian schools of architecture and the practicing profession has been weak for some time. The seemingly interminable debate regarding accreditation reveals a profound lack of confidence and trust on both sides. The gulf which has separated the schools and practice for 15 years is the product of various conditions, some particular to the Canadian situation and some virtually universal in architectural culture [5].

If this alienation had its origins in the adoption of radical political and pedagogical positions in schools of architecture in the 60's and 70's, it is safe to say that our present difficulties have different causes. Historically, university schools of architecture have been devoted almost exclusively to professional training and have supported little research activity; recently, however, they have become markedly more scholastic. The indicators of this transformation are everywhere in evidence: advanced degrees, papers, publications, funded research projects, and academic conferences proliferate. Fewer and fewer practicing architects hold regular teaching posts, though a great many, especially younger practitioners, are involved in schools on a part-time basis. There has been a marked revision of, among other things, the evaluation of professional experience in academia. Typically, the young designer now places a high value on being involved in the intellectual and creative milieu of the school, while the schools have, in general, shown themselves to be less disposed to look to the experienced practitioner for a contribution to the education of architects.



For their part, universities are increasingly unwilling to accept the position that professional schools differ from traditional academic units in their formation, intentions, activities, and qualifications required of faculty at the entry level. A doctoral degree is a common minimum requirement, even in professional schools. In every university, advancement depends on achieving a pattern of activity that conforms closely to a scholarly model. Despite the fact that evaluation criteria for promotion and tenure have generally been broadened to include creative and professional accomplishments, there has been a consistent movement into research activity by faculty members [6]. Through this movement, the field of architecture is becoming not only more academic, but also more fragmented. The quest for grants and publications forces individuals to conceive and present their activity in terms of specialized categories of investigation remote from architectural activity and discourse, and unrepresentative of the synthetic nature of design.

At my own school, there has been a tremendous increase in research activity. The phenomenon is certainly institutional, but often occurs within the career of an individual faculty member. Many of us are producing scholarly work outside our vocation, having moved into areas such as archaeology, history, philosophy, building science, behavioral science, and computer science, in some cases with specific post-professional study and in others without.

On the positive side, this turn of events has brought credibility to schools of architecture within universities. It has smoothed the career paths of architectural educators and it does, at least theoretically, improve the knowledge base from which architects act. Despite these gains, the faculty whose primary mode of activity is design are still in a tenuous position in performance evaluation, promotion, and tenure reviews. This well illustrates the widening gap between the types of thought and action characteristic of architectural schools and those which are characteristic of architectural practice. Whether the research of which we are speaking falls into technical, social scientific or humanistic realms is irrelevant. The application of overly specific, external, and deterministic criteria - the domination of praxis by theory - actually reduces the scope and significance of design activity.

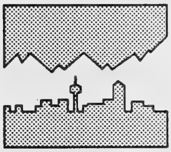
It is, therefore, dangerous for the schools of architecture to move very much further in the scholastic direction without considering the possibility that by doing so they risk losing the sense of architecture as a praxis and, as a consequence, forfeiting their central - some would say, privileged - role in the formation of young architects and the formation of architectural culture.

In spite of these risks it would be a mistake to over-emphasize the marginalization of the schools at this point. Indeed, the most radical change in architectural ideology over the past thirty years has been driven by the critical and speculative activity going on in schools. Such activity has been, and will continue to be, a motor which propels practice, changing basic assumptions about the nature and intentions of architecture. Post-modernism, for example, in its profound re-evaluation of the relevance of architectural history and traditional urban form in architectural design is, in the first instance, an academic phenomenon whose roots in North America can be clearly traced to the work of Scully, Venturi, Rowe and Bacon. The bridge to practice was constructed by the likes of Graves, Tigerman, Stern, and Moore, whose base was also predominantly academic.

However, to acknowledge the academic sources of many design ideas and approaches is not to suggest that they are truly products of research, particularly in the scientific sense. Rather, what has operated up to now is primarily architectural polemic and speculation, leading to dissemination of image and style. While this is in keeping with the view that architecture is, above all, a form of cultural expression, it actually stands in the way of establishing a genuine base of research activity within the field.

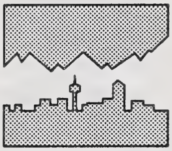
Afflicted, on the one hand, by impenetrable jargon and the popularity of critical theories that deny the existence of genuine unmediated experience, and, on the other, by those who hold it to be an instrument, a commodity or an anachronism, architecture struggles for its existence. Certainly it must demonstrate its value, but the cards appear to be stacked against it in this country. The schools of architecture, the national institutions, and the profession itself are solitudes. To think of architecture as part of culture is particularly difficult when general understanding and expectations of it are so limited.

Forces are afield that place new demands for the establishment of authority in all aspects of public life. Traditional professional privilege and authority is clearly eroding; architecture, like other professions, is constantly challenged to justify itself and, particularly, the apparently privileged status it enjoys by virtue of being a self-regulating and monopolistic group. Moreover, the range and stringency of design regulations has increased radically. The general climate of skepticism is expressed in the level and stridency of environmental concern and the vast and cumbersome mechanism of formal environmental assessment which will soon fully engage architecture. As a result of these changes the basis of architectural design must become both more explicit and more inclusive of various interests. New sources of authority are required. While these will not be objectively determined, they can be achieved by the application of rules of discourse and argumentation, by the appeal to evidence, precedent and principle, and by inculcating architects with the habit of examining, recording and disseminating their activities in the broadest possible context.



It is my position that for the profession of architecture to maintain some semblance of its traditional range of activity and influence, it cannot depend on legislation or more stringent educational requirements to defend its frontiers. Rather, the culture of research that now exists in the schools of architecture must redirect itself to assume a position clearly aligned with the theory and practice of architecture. At the same time the profession must become open to research and discourse in new ways so as to allow itself to carry on in a changing cultural, political and legal climate. We academics are used to hearing that some people talk about architecture while others do it, and that, by and large, the two groups are mutually exclusive. But increasingly, as in so many other fields, to be unable to talk about it effectively means to be unable to do it.

It is not, however, the intention of this paper to attempt to limit or define the scope and nature of architectural discourse. One must remain aware that architecture's position in human culture is of such complexity and centrality that few aspects of the arts or sciences are completely divorced from it. It is curious to note, therefore, that a recent learned conference had as its subject the question; "Is there architectural research that is not building science?" A newly established school of architecture in the United States proudly announces that its curriculum is based on the proposition that architecture is "an applied social science". What terrifyingly narrow thoughts! And yet how characteristic of our dilemma and the ongoing debate between the scientists and the poets (to resort to rather crude caricature) in North American schools of architecture. If architectural research is building science or social science, can architecture itself be any more? We must proceed in the certainty that architecture is not one thing, but an activity which naturally makes diverse and contradictory propositions about itself.



The fallacy that architecture is coherent and that its principles could be revealed by systematic research is itself an identifiable particle of its own cultural history. Consider the ancient notion of architecture codified by Vitruvius. Fundamentally open and heterogeneous in theory, architecture paralleled the other arts and shared certain basic principles such as representation and symmetry. Its practice depended on knowledge accumulated within the field and conversance with virtually all of the arts and sciences. For the ancients, architecture was intrinsic to human culture. In his account of the origins of architecture, Vitruvius explains that shelter is a human need, and that to dwell is in the nature of the human being. He cites not one, but five separate examples of the original dwelling, making it clear that culture is logically prior to architecture and intercedes between the man-made and the natural worlds. Finally, explicit in Vitruvius' discussion, is the conviction that there is no deterministic connection between the terms of this relation.

Quite different is the position taken at the dawn of the modern era by the French theorist of architecture Marc-Antoine Laugier. For Laugier, architecture does not imitate itself, but nature; consequently, architecture is not intrinsic to nor bounded by culture. He criticizes Vitruvius for "avoiding the depths of history" and limiting himself to the "the road of practice" [7]. Practice must be sustained by theory says Laugier. Consequently, in his account of the origins of architecture, the many culturally discrete houses of Vitruvius dissolve into a single primal dwelling, a "rustic hut" in the woods built by the proverbial savage inspired by necessity to pile up fallen branches and leaves. The illustration accompanying the original text goes even further in asserting the natural origins of architecture, showing living trees as the corner posts of this archetypal structure. In this way, Laugier gives architecture a single and universal origin located quite literally within the realm of nature. On this tale, in effect a creation myth for architecture, rests the assumption that the field can be, first, understood as the expression of a coherent principle or set of principles, and, second, investigated following the same methods applied by science to the study of the natural world.

It is not a simple taste for pluralism, but a profound distrust of the application of the scientific model of research to cultural products that inclines me towards the openness and heterogeneity of the Vitruvian proposition. Thus, it is my position that, in its search for authority, architectural research must operate within the realm of cultural discourse, and must understand that any undertaking that treats architecture or architectural phenomena in a purely instrumental fashion at best applies only to a small part of the field, and, at worst ,distorts or subverts it.

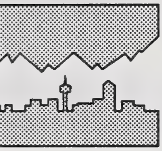
Research, therefore, must not be expected to contribute objective authority and value to architecture, but to provide it with the means to relate to the world in which it must operate, to locate, discuss, and reform both its methods and its products.

Returning, finally, to C. Wright Mills' idea of the "Sociological Imagination", I propose that our situation in pursuing architectural research is analogous to that of the social scientist in that we must avoid simple formulae and false instrumentality. Replace the word sociological with architectural and the following text defines the position of the researcher in our field:

> In large part, contemporary man's self-conscious view of himself as at least an outsider, if not a permanent stranger, rests upon an absorbed realization of social relativity and of the transformative power of history. The sociological imagination is the most fruitful form of this self-consciousness. By its use men whose mentalities have swept only a series of limited orbits often come to feel as if suddenly awakened in a house with which they thought themselves to be familiar. Correctly or incorrectly, they come to feel that they can now provide themselves with adequate summations, cohesive assessments, comprehensive orientations. Older decisions that once appeared sound now seem to them products of a mind unaccountably dense. Their capacity for astonishment is made lively again [8].

Mr. Roth: As a result of the approach that many of our schools are still following, architects do not understand research. Architects do not learn how to do research in the course of their formal education. They do not even understand what it is. The problem is the lack of a working definition of architectural research. Such a definition has to be based in architecture. I have not found a completely satisfactory definition of architecture, although one I like is Hans Hollein's who, somewhat inaccurately, said that "architecture is the manifestation in physical form of the spiritual nature of man, his life, and of his destiny." With Dr. Stein, I believe that the highest priority for research is to develop a theory of architecture which incorporates the need to express the meaning of life. If we do not understand the meaning of existence, we cannot respond to it in our buildings. If our buildings fail to respond, they are not architecture - they are nothing more than containers. Contractors can build buildings. Engineers can build buildings. Anybody can build buildings. Architecture is different. Architecture has meaning. This meaning has to be about life itself. It has to ascribe to the highest possible understanding, or we produce nothing more than a container.

The design of individual buildings has to be the heart of both architectural practice and research, as Dr. Baniassad said. The next larger sphere of concern is the architectural practice, because a practice addresses many design projects. The next larger sphere, is the profession. In fact, there are ten professional bodies within Canada, so there are ten of those spheres within a larger one, called the discipline of architecture. There are several other disciplines within the larger sphere of society. From these different levels, information flows into the individual design project. As we do research, information flows back out of the project. But the heart of research must be the individual design project.



I suggest that architectural research could be defined as deliberate and careful inquiry, for public or private purposes, into the art and science of creating spaces for human activity. I think the distinction between public and private purposes is important because, as practitioners, we do research, but it is private in nature. It is distinguished by these characteristics:

1. It does not usually require documentation
2. The results are immediately incorporated into a project or into personal experience
3. It is usually done during the predesign or schematic design phases
4. It is usually intended for immediate application and constrained by project or personal resources
5. It is usually oriented to the needs of a specific project
6. Normally, it is not funded by outside agencies

I consider such work to be research, but let us call it private research. It is not reviewed or published. The results are embodied in the project itself. This is public, but the way in which the architect came to an understanding and the results of the enquiry do not become public knowledge. The knowledge is buried in the building.

Public research, on the other hand, requires disciplined documentation. This is something architects do not learn very well in school. Public research must add to shared knowledge. While it may be developed in the course of a single or limited number of projects, its results must have general application. Public research usually requires time extending beyond the life of a specific design project. It usually requires outside funding. If we begin to make that distinction, and let our practicing colleagues know that the research they are doing in the course of practice differs from the public kind that is normally done in other disciplines, I think we would progress in developing an understanding of research among practitioners. I think that both public and private research are valid. I am simply arguing that there are two facets of architectural research.

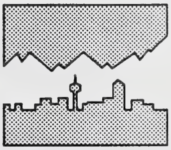
We need to clarify the distinction between producers and consumers of knowledge. Generally, architects do little "public" research, but they are supposed to use it to improve architecture. As I have already said, architects are not taught how to do research. Other disciplines, notably engineering, have made a concerted effort, involving their schools, their practices, and funding agencies, to develop a research-based profession. The people who do research related to architecture are often based in other disciplines. They develop knowledge, but it has to be translated in order to be used by architects in designing buildings.

The last item on my list of issues is the establishment of research priorities within the discipline. We will differ in our views, but as a discipline, we need to establish some common goals. Funding agencies will ask: "What are the weak spots in your discipline that currently need work? Where should we place our limited resources?" We should be able to respond to these questions, recognizing that our priorities will change over time. Only by concentrating resources can we progress along with other disciplines.

The notion of environment as one of the current high-priority issues is metaphorically interesting. People now are very interested in the external environment. On the other hand, people are also interested in the inner or spiritual environment. The connection between these inner and outer environments is, in fact, a central issue in architecture. When architects understand that, when we incorporate that view into our work, then we can once more make this discipline meaningful to society.

Discussion

Dr. Stein: We might be able to develop a definition of research, a definition that would be as correct as it would be unenlightening. We will not find an operational definition, because one of the problems in architectural research is seeking an operational definition for everything. One of the propositions I am arguing is that we have to abandon the notion of setting up strict criteria and procedures to guide us to a result. It is not as simple as that. Research is just a matter of doing something worth doing, something which is of value to other people. That can be anything from scientific research in the traditional sense, to literature, art, and other creative activity. It can be any of these things. It is what works.



Now, how do we evaluate such activity? Well, evaluation is the problem. One of the features of the post-modern crisis is that we are moving away from accepted forms of evaluation and accepted forms of critique. We are moving into an era where new mechanisms of evaluation are being created - new cultures, for that matter. The criterion of value will be acceptance by people who are part of a culture which is itself valuable. We cannot establish that in any *a priori* way, certainly not in terms of the reductionist, operational, scientistic mechanism that has been widely used in the last fifty years. This is especially true when dealing with something as sensitive and culturally relevant as architectural research.

Prof. Haldenby: I would like to address two unrelated points. The first stems from the questionnaire issued to symposium participants in advance of the meeting. Respondents were asked to give examples of successful architectural research. That question baffled me. I said to myself, "Well, how does one judge success?" One might judge success by manifest results. The most successful architectural research, as reflected in education and in practice, has been theoretical and historical research. Judging by what is being built, the reassessment of the value of history and tradition, has been hugely influential. It has percolated down from the most theoretical and abstruse academic discourse to the most low-grade, non-architectural processes of construction. This has produced a crisis because we lack an integrative approach to architecture.

The reasons for the appearance of the phenomenon of the critique are completely different from the reasons that this critique has been so easily applied to the design of buildings. It is an issue that perplexes me. This leads me to speculate that we require not only more research, but more discourse. As Dr. Baniassad stated, we are producing a lot of knowledge about architecture and related to architecture, but we are still at a relatively primitive level in terms of our ability to discuss it and evaluate its significance. Certain information has great instrumental value. It helps us plan and construct buildings, but it does not have a tremendous amount of influence on those aspects of building that are poetic and spiritual, aspects that we have recently dealt with by a rather nightmarish process of assimilation of historical form.

The second issue relates to comparison with the engineering profession. The distortions of which Dr. Baniassad warned us are evident in the engineering world. The graduates of the Department of Civil Engineering at the University of Waterloo have little interest in being consulting engineers. They are scientists and researchers. We have seen a drift away from a concern with practice. In Ontario, we have a crisis in the engineering profession. The only consulting engineers available to architectural firms in Ontario are professionals who come from other countries and establish practices.

This issue is so important to the schools and the profession that we have to overcome our trivial differences and address it together. The steps we take in changing architectural education have to be made cooperatively. The development of architectural research sounds attractive and is important, but we have to be circumspect about protecting central aspects of architectural practice and education.

Mr. Bazley: Instead of spending our time attempting to define architecture, we should be seeking a process for research. If we developed such a process, then a large number of people throughout the country could participate. Scientific research is understood. One formulates a hypothesis, chooses methods, makes observations, analyzes results, and evaluates the hypothesis. The process is simple and can be applied to a broad range of problems, for instance, housing for senior citizens. I believe it can be used in architectural research. I believe that practitioners represent a wealth of knowledge and skills. I have the highest respect for my colleagues, but I could not find even one in a hundred who is doing research. Practitioners do not know how to do research. If a body such as this promoted a process for carrying out research, I think we would go a long way to making a significant contribution.

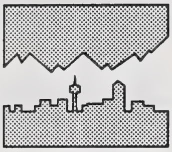
Mr. Lincourt: I agree with Mr. Bazley. I am a practicing architect. My problem is very simple - every day I build buildings; every day I face problems. Some of these problems are very complex, and some are simple. Nonetheless, they are problems to be resolved. They involve human beings, they involve technical matters, they involve materials, they involve the functioning of buildings, and so on. I have at my disposal neither instruments nor a coherent body of knowledge, whether we wish to build a better hospital or a better bank. To me, architectural research should be directed at developing a body of knowledge and developing instruments. I compare myself with doctors. The job of doctors is to cure people. A practicing doctor has instruments, books, and an organized body of knowledge. A practicing doctor is supported by an incredible army of researchers which provides tools to do a better job. We have no one. When we call the National Research Council with a problem, rarely can they provide a viable solution because they are not organized to support architects. I also compare myself with people who build airplanes or satellites. I see the tools that they have at their disposal and the way they approach problems, very complex problems. Our profession also deals with very complex problems. So, to me, the purpose of architectural research is to give me the instruments and the body of knowledge to do better work.

Mr. Bobrow: When I graduated as an architect, I wanted to create good architecture. The first series of projects that I encountered left me with an understanding that has stood me well during my career; the way we design and build is a highly irrational process. I start from that premise. As Mr. Lincourt has pointed out, we do not have the knowledge to deal effectively with some of the problems that result from changes in our culture. Imagine if doctors had to pay for their hospitals - architects do not even have hospitals. To install computers in my practice, I had to make a personal investment to obtain the tools which I felt were necessary to deal with the problems we have to handle.

The issue of subjective and objective problems is easily resolved. Architects have to deal with it all the time, and there are ways of dealing with such concerns. For example, our firm designed a programming classification system to help us generate architectural programs. We allowed both subjective and objective criteria to be included. The statement of a drug user who says, “If I have to be in a place dealing with intoxication, I want it to feel like home” is an assertion that I can include in a program.

We need not limit the scope of architectural research. We need not have a purely scientific approach to research. In fact, we can have a multi-dimensional view that reflects the concerns of our profession. Let each school decide the balance it strikes in its enquiries. We need not limit the scope of research. If a student wants to study rhythmical applications of color and time to the elevation of a building, let him do so. If the work is esoteric, it will be set aside.

In considering ways to improve buildings, our practice does not make the distinctions that are raised here regarding theory and the application. We have to deal with both poetic and functional aspects of design.



Dr. Baniassad: I am distressed that the educational side of the problem of research in architecture can be dismissed by simply saying let students do theoretical work such as colour studies, then let that work be put aside. The educational side of architectural research is critical. It is necessary to provide the foundation for doing intelligent work.

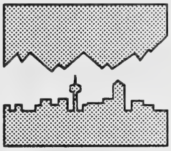
Prof. Tregebov: I detect a pattern of thought which I find rather dangerous, the *a priori* belief that research is going to lead to better buildings and hence a better quality of life. Will research give us better cities? Have cities improved over the last two or three hundred years, or do they provide their inhabitants with a lower quality of life? I think that the search for a definitive body of knowledge for use in practice is dangerous. One thing we are beginning to realize about research is that the more we learn, the more questions arise. That has happened in physics, which is widely used as a model for research. The definitive body of knowledge seems to be a very elusive goal. Unfortunately, the research model by which funding agencies judge proposals for architectural research involves narrowing enquiries to something specific enough to be tested according to the scientific method.

Dr. Stein: I would like to address the analogy of medical science. One might think that, in the case of medicine, we have clear goals. That is true in many instances, but even in medicine there are serious problems with the "scientistic" approach [2-3]. For instance, consider the use of life-support systems. We have the means of keeping bodies from collapsing. Is the maintenance of these functions an appropriate goal for doctors? In order to decide what the physician should do, we have to address the question of the life worth living. That problem is even more important in architecture - it is not simply a matter of satisfying people's desires, or just keeping them going, or building a machine for living; the question for architects is, "How do we provide a built environment which reflects a life worth living?" We cannot separate the question of architecture from the question: "What kind of life is worth living?" We have not yet answered that question. The question of what we should build is not disconnected from the question of how we should live. Science is important, building is important, the environment is important, and living on this planet is important, but they are important because there is a question which is even more important: "What kind of life is worth living?"

Mr. Bazley: I would like to defend scientific method. I think the support for my argument is actually found in the two arguments produced by Dr. Baniassad and Dr. Stein. Firstly, Dr. Baniassad said that we are in the prehistory of architectural research. I think that is correct. Dr. Stein said that research has now led us to the position where we have to make judgements regarding the acceptability of doctors sustaining body functions with life support systems. The only reason we can have that debate is that medical science, through research, has progressed from a time two hundred years ago when doctors were killing more people than they were saving. I submit that architects have to start doing something. There are hundreds of topics to be researched.

My focus is residential research. I can name a half-dozen topics that I would like to see people addressing, questions for which we do not have the answers. When I say that we need a process, I am saying that the scientific process of postulation, observation, and evaluation will lead us to some of those answers. I am not saying that we put everything in a "test-tube", only that we need a rigourous system, peer reviews, dialogue, and other processes to develop better research. If we have a legitimate process, if practicing architects and students are trained in rigourous research techniques, and if we achieve some results, then we can have some philosophical arguments. We are not in a position to have them today.

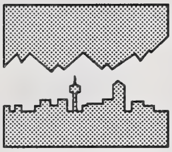
Dr. Stein: As I stated earlier, there are three kinds of human interest. There is, first of all, a technical interest, an interest in controlling the physical environment. There is, secondly, an interest in understanding ourselves as social entities. Thirdly, there is a critical interest. I am not denying that there is an interest in controlling the world, the technical interest. Science is a useful technique in controlling the physical world, and it satisfies one of our interests, but the primary issues in architecture begin with questions like: "What kind of world do we want to live in? What kind of world should we live in?" It seems to me that architecture is a reflection of these higher order interests. Even when complete technical control, if at all possible, is gained, these other questions will still be with us, as they are with us now. Recognizing them as important architectural issues does not deny the importance of other issues such as questions of performance.



Mr. Archer: I see no purpose in developing a precise definition of architectural research. It seems more important to get on with it - to do research. Out of the doing, a clearer picture of research needs will emerge. If the academics have a particular interest, they can pursue it. Likewise in the case of practitioners

The greatest challenge is that the profession itself seems unable to marshal the research resources necessary for practitioners do their job. We lack a research culture. There are structural impediments in the way construction contracts are let that prevent architects from accessing resources to undertake research. We need to address these problems.

Dr. Baniassad: The suggestion that we should get on with research and not talk about it is wrong because it assumes that we know what to do, that these enquiries are just gut-level actions, that one just gets up and does some sophisticated piece of work. Sophisticated work cannot take place in that way. The everyday experience on which we base the conduct of our lives has a limit, especially as a basis for serious enquiry. We are not here talking because we want to stop anybody from acting. If we knew what to do, we would be doing it. I challenge those people who say, "Go out and get it done rather than talk about it" to show me good research that has been done without careful thought.



Many things that are done in the name of research are worthless. Simply because something can be studied and the results placed between two covers does not mean it is valuable research. Library shelves are full of material that has not made one iota of difference to the quality of our built environment. I am sure much of this work was funded. We have to challenge some of these simplistic positions.

I challenge those in this room to tell me why the buildings that we build are so dreadful? Bay Street is a dreadful street, yet the buildings there were designed by some of our most distinguished practising architects. Why is it so dreadful? Why does it fail as a street? Ottawa is full of buildings that do not add up to a city. Why? One cannot dismiss these questions and simply say, "We will study them as they come up." I suggest that something is fundamentally wrong in the way we are educating people who become architects. Increased funding of research will not correct these faults. There is a more fundamental problem in the value system that shows up in filling the land with containers and not making cities.

Prof. Haldenby: The Shadbolt-Carrothers report presents a model of architectural research which encompasses all of the forms of research discussed here, from questions of theory and the relationship between architecture and being to technical issues. When one thinks about the analogy between architecture and medicine, one thinks about the lack of an existence of a vehicle such as the New England Journal of Medicine. This provides a forum for both theoretical and technical statements and debates. We do not have to exclude any of the models of research that are being proposed, from direct service to the practicing professional to basic questions of the place of architecture in culture.

The critical issue is the establishment of the idea of research. We have to begin a discourse. We have to redefine the notion of architecture as inherited praxis that has existed since Vitruvius with a concept that is much more open and accepts a diversity of models of activity.

Notes

1. Benedikt, M., *Prospectus.* 1989, Austin, Texas: School of Architecture, University of Texas at Austin. p. 68.

2. Geuss, R., *The Idea of Critical Theory: Habermas and the Frankfurt School.* 1981, Cambridge: Cambridge University Press.

3. Habermas, J., *Knowledge and Human Interests.* ed. T. Shapiro. 1971, Boston: Beacon Press.

4. Mills, C.W., *The Sociological Imagination.* 1959, New York. p. 5.

5. Prof. Haldenby: The lack of a properly constituted review of professional pro-

grams in architecture is the particular condition in Canada that has been most detrimental to the development of common purposes and exchanges between education a nd practice.

6. Mayo, J.M., "Dilemmas of Architectural Education in the Academic Political Economy." *Journal of Architectural Education*, 1991, **44**(2). pp. 80-89.

7. Laugier, M.-A., *An Essay on Architecture.* 1977, Los Angeles: Hennessey and Ingalls. p. 2.

8. Mills. p. 7.

PANEL: DESIGN AS A FORM OF RESEARCH

Esmail Baniassad, Colin Clipson

Dr. Baniassad: I will approach the topic of design as a form of research by discussing a project in which I am currently involved. From the perspective of the funding agency, the International Development Research Centre (IDRC), this project involves the development of earthquake-resistant housing in very low-income districts of Lima, Peru. That is the official definition of the project because that is how it fits IDRC's mandate for supporting research. I have treated the project in terms that, I think, illustrate the use of design as a form of research.

A couple of points are very important in understanding this project. Firstly, the researchers proposed an approach to research involving an "umbrella program" accommodating several projects. The funding agency agreed to this approach. The project I will discuss was a singular instance of a series of projects. Secondly, the researchers believe that architecture and technical matters can be discussed separately, but that they are not separable. For instance, it is possible to do research on earthquake-resistant construction in structural laboratories, as indeed we have to do at a certain point in our project. However, before such isolated aspects of the research program become a part of the whole, they have to be filtered through several other small, bounded research projects until we reach a point at which we cannot distinguish between a question being entirely technical or entirely architectural. The technique and the architecture are knit together. For example, the problem of siting a simple building on a piece of land so that it is less prone to earthquake problems is an architectural problem in this project rather than a problem with a cut-and-dried technical answer.

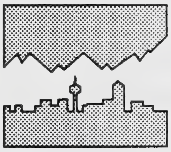
There are many instances of problems caused by the separation of architectural and technical questions. I wanted to ensure that such separations did not compromise our work in Peru. From the beginning of the project, it was highly likely that the results could have been compromised. In this particular region, many projects built since the 1960 have not yielded the promised results. Outstanding architects have been associated with some of these projects. Structures have been built, called housing, that are not being used. These are some of the challenges we were facing.

My way of organizing the project was to focus on what I considered to be the real problem - the social agenda. I felt that we had to develop an architectural approach to the problem before we could be effective as architects. The people needing housing are poor. They have been dislocated from mountain regions with rich traditions of building. Their culture is far more developed than one would imagine from the level of their technology. The government can support few of their aspirations. This gives some idea of the situation faced by the researchers.

In order to arrive at some way of working, I set out an architectural frame of reference. Architectural presuppositions were adopted. Firstly, it was assumed that every shelter has a platform, a roof and water. We deferred decisions regarding the specific form of each of these, because we knew that, in the course of our research, we would deal with the details of the presuppositions that were giving us a conceptual foundation reflecting an architectural sensibility.

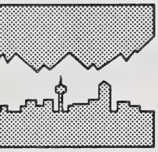
The second presupposition was that the simplest significant form in any architecture is the home. There are, architecturally speaking, simpler ones, cruder ones, but we said, "Let the simplest element of our architectural family be the home." We had already defined the essential features of the home through our first presupposition. Then we said, "Let the most complex form in architecture be the city." We let the city be defined as the area of 300,000 residents for which we were designing.

The third presupposition was that every intermediate form, that is every form between the home and the city, is an upward transformation of the home in the complexity gradient between the home and the city. For example, in considering a school, we assumed that a school would be be arrived at through some highly intricate transformation of the home. To create a high school, we would use the same process and construct some map of this transformation. This transformational map should reveal the distance the community has had to come in development, and how it has come to this point, in terms of intentions as well as in terms of technologies, in order to create a school, a library, or a community centre.



Finally, it was assumed that the architectural fabric of any city develops in generations, not in functional times. This meant that there would be a first generation of buildings which would do everything. We would make no reference to function, except in dealing with critical dimensions. For example, if we designed something that is four metres square, the assumption was that, if this was the first generation of buildings, it would serve for all functions. If people wanted to live in it, it would be suitable. If people wanted to gather in it, it would be a gathering place. If children were taught there, it would be a school. We did not base our view of development on growth by functional times.

This led us to the formulation of the research program. This included a program of investigation covering working habits and other relevant aspects of the lives of the people, followed by the development of designs. We arrived at a critical module which could be built, taking into account the various activities that would have to be accommodated and the structural and constructional problems. The primary principle was that whatever resulted should be available, accessible, and acceptable to this community. All of these criteria have to do not only with affordability, but also with concerns such as cultural appropriateness. As I have already mentioned, many houses designed for this area by distinguished architects are not being used because the intended occupants have not accepted them for cultural reasons. This was where we began two and a half years ago. It made many differences to the way we worked, and I would like to mention some of the salient departures from the typical approach. The engineering aspects of such research projects are usually carried out in laboratories rather than in the field. Such traditional approaches had already been attempted by others, without success.



To date, we have produced, as planned, seven buildings. Three of them are are being used as community centres and libraries. The rest of are being used as schools. Several houses have been built on the basis of the skills that people learned in erecting the larger structures. At the beginning of the project, we were only involved as architects and engineers. Lately, a team of teachers, social scientists, engineers, and architects has been studying the buildings. Some of these researchers are affiliated with the schools of architecture, social sciences, and engineering at the Catholic University of Peru. The way we have been working has provided a basis for testing our hypotheses. In fact, our approach has also provided a basis for studying some aspects of architecture in other places.

Prof. Clipson: I believe that the way designers work in practice has received little serious attention. We have neglected design as a legitimate form of inquiry. Architects are their own worst enemies in failing to pay adequate attention to design as a form of inquiry and the ways in which we might more carefully study design in practice as well as in the academic setting.

Formal training for designers is very recent. In Germany, France, and the United Kingdom, it did not begin in earnest until about 1865. It was introduced for commercial rather than for artistic reasons. University-based architectural education in the United States began at Columbia University in the 1890's. However, census records for 1880-1890 show that only 120 of the architects then practicing in the United States were educated at Columbia. During the Great Depression of the 1930's, 90 percent of architects in the United States were unemployed. This led to a considerable decrease in demand for formal training. That demand did not recover until after World War II, when there was an explosive growth in university programs in architecture. So, widespread university-based architectural education is a recent phenomenon.

Certain schools of thought of have had a great influence on design education during this century. These include

- The Select Committee Reports on Art and Manufactures, London 1840-1850

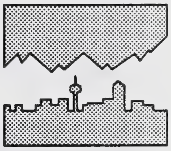
- The Arts and Craft Movement

- The Beaux Art tradition

- Cubism, which, like the theory of relativity, led to a major change in the way that people viewed the world in the early part of the century
- The Bauhaus
- The Modern Movement and International Style
- Systematic design methods, originating in a small town called Ulm in southwestern Germany
- Architectural system engineering and construction
- Computerization and expert systems
- Post-modern ideologies

Dr. Donald Schon of MIT, who is a sociologist, has studied working methods in a number of professions. He coined the phrase "the reflective practitioner" to refer to a model of professional practice that he maintains is more accurate than the one he refers to as "technical rationality" [1]. He has written incisively about the reflective nature of designing and about the "conjecture and test" approach to problem-solving. Designers seem to value his findings, because an international body of designers gave him a prize for an essay last year, the first time this prestigious award was made. Schon has explored the question of the reflective activity of design as a form of enquiry. He has written about designers "prestructuring" bounded parts of the world as an effective way of generating solutions. I think this is recognized in other areas of investigation as a legitimate point of departure. One tries to establish what Schon calls a "holding area", a way in which one can make the situation "sit still" so the investigator designer may make progress.

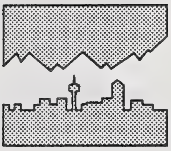
One of the key elements in considering the potential of design as a form of enquiry is something that practicing designers take for granted, the act of representation. In order to prestructure a problem, one has to select some form of representation. This is not necessarily drawing, although drawing is one of the forms of representation that architects use. Omer Aikin, and others, have discussed representation as a way of making connections between an "inner world" and an "outer world." That connection is very important in design, in problem-solving, and in research.



Another question is, "Which approaches are intrinsic to designing itself and which are borrowed?" If we reconsider the design traditions I have listed, we can see that some approaches are borrowed and some we can claim to be native to architecture. As I have said, designers develop paradigms or representations for enquiry, and I think this is a legitimate form of research. I will briefly review what some of these paradigms.

The most obvious is what I would call the **pragmatic** model, trial and error. Geoffrey Broadbent says this is a particularly American approach to design.

There is a **typological** approach. One assumes that, historically and in terms of world culture, there are prevalent forms which may be re-used. For example igloos, are a "type" used in arctic areas. The concept is more difficult to apply to more complex environments such as Italian hill towns. Le Corbusier used the typological form of enquiry. The International Style exhausted itself on this form of enquiry. Paul Valéry, the poet, put his finger on a key conceptual problem in the typological approach; it is easy enough to come up with alternatives, the difficulty lies in the process of, and criteria for, selection. Valéry says it takes two parties to make a real invention. One gets the idea, and another has to choose.



The third kind of inquiry can be called enquiry by use of **analogy**. This has been one of the richest sources for a generation of architectural researchers. I have already mentioned Cubism. Many architects who were greatly influenced by Cubism or by Relativity, have used these concepts as a way of enquiring about the physical environment and the use of the physical environment. The architecture of participation in the 1960's and '70's is a very powerful expression of the analog approach to enquiry. I would suggest that the work of Norman Foster and Richard Rogers is nothing more than a rather sophisticated use of the analog approach to enquiry. "Hi-tech" is a misnomer. There is nothing "hi-tech" about the work of Foster and Rogers - it is formal and enquiring.

Another approach could be called the **syntactic approach** to enquiry. It is based on geometry and mathematics. This can be seen in Egyptian architecture, in the Gothic cannons of proportion, and so on. We can see it in the work that Peter Eisenman has done in House II and, more recently, in his studies on urban forms in Chicago.

The engineering part of the architectural community commonly employs the paradigm of **performance**. If we want to examine how built forms work, then many performance enquiries can be made, from human need and aesthetic responses, to load-bearing capacity, thermal-acoustic properties, traffic circulation, cost, and so on.

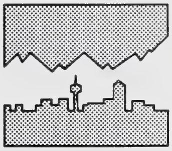
There is the paradigm of **production**, design as making, because designing is about making. Making and assembly follow design. This approach involves consideration of alternative production methods, structures, materials, manufacturability, ease of assembly, industrialization, and so on.

As a victim and a beneficiary of systematic design methods, I certainly had problems applying Chris Jones' and Bruce Archer's process of briefing, problem definition, analysis, synthesis, evaluation, and implementation. The approach that Archer, Jones, and other design methods researchers developed focussed on the idea that there are repeatable steps in design, and that they could be systematized. I was terribly relieved in the early '70's when Jones reevaluated his paradigm on systematic design methods. A lot of it was misused, but it is amazing how much of it has been retained. Fortunately, in the '70's somebody said, "Wait a minute. There something is missing between analysis and synthesis. That model does not work." For me, this was a critical point in the last 30 years. There has been a very significant realization that analysis cannot account for synthesis. It is a totally different activity, which we have yet to understand well. I would suggest that this understanding is essential to the development of design as a form of research. We must understand the transition from analysis to synthesis.

During the '70's, there was a tendency to use techniques borrowed from other disciplines. The uncritical adoption of such methods has led to dysfunction in the design process. I think it comes from the lack of understanding of the way in which designers work. One of my favourite examples is post-occupancy evaluation (POE), which I know is very popular in Canada. The medical profession is now being very severely criticized for focussing on the tertiary end of the health care system, waiting to treat dreadfully ill people. POE, so distinctly placed at the end of the construction and occupancy process, is rather similar. These borrowed approaches are not effective aids to design.

Discussion

Dr. Baniassad: I believe that the "design methods" school left less in the world of architectural education than has been suggested. If we look at the present state of architectural education and practice, we do not see much influence. In the work of Christopher Alexander himself, we do not see much sign of it. There were extensive shortcomings in the "design methods" approach, and I think they should concern us. Certainly, I am not nostalgic about it. I think we have been insufficiently critical of these concepts. This research consumed considerable resources and diverted attention from other avenues of enquiry. Even at the time that it was going on, possibilities existed for a different approach to architecture and to design as a research method. That was one of the most sterile periods in architectural education and, by extension, in architecture. We are now left with ways of working in schools of architecture which, when one dismisses the rhetoric, by and large equate to 19th century pre-"design methods" approaches. There has been little progress in critical thought.



The "design methods" period is an interesting test case for what research can and cannot do, what is promised and not delivered. These are serious problems in architectural research. I hinted at the failure of the design methods approach in my discussion of the Lima project. Considerable resources were consumed by seriously flawed thinking. Their best effort was doomed to fail because of flaws inherent in their approach.

It is important for some people to consider design in a different way, a self-critical way. We need to experiment consciously because we do not seem to know enough. If Aldo Van Eyck does not know enough, I certainly would not claim to know enough. He designed a lot of housing around the airport in Lima, but people refuse to live in it. If even our most brilliant practitioners fail, we need to be more self-critical and establish a disciplined approach. Then we can begin to talk about design as research. There has to be an explicit accounting for the way we work on specific projects. Then we can consider the results and say, "Maybe something happened because of the way we worked." Others can look at it and say, "Maybe this is where these people went wrong." The problem with the usual approach is that architects fail to be explicit about human factors, historical issues, cultural issues, person-environment relations issues, and so on.

Dr. Stein: We have to distinguish between procedures for making decisions, which tell how to go about creating a product, and evaluation or justification of the legitimacy of decisions. There may be rules of thumb that can help in achieving human goals, but I do not think one could ever develop predeterminate decision procedures to achieve such goals. Goal achievement in architecture is a creative process, not merely technique.

Mr. Bazley: Prof. Clipson, could you explain to me what is wrong with post-occupancy evaluation? I would have thought that is how we find out what our mistakes are?

Prof. Clipson: We need predictive tools of evaluation for design. We should not wait until after we build to find mistakes. We do not develop designs for aircraft that way. Mr. Bobrow wrote an article, about 20 years ago, that addressed the use of evaluation during design [2]. Post-occupancy evaluation was a very easy form of research. It was popular in architecture schools in the 1970's. They said, "Ah, good, a lot of buildings out there that don't work! We have sociologists, psychologists, and survey research skills. Why don't we see why they didn't work. Then we write something up on it and publish it somewhere." The trouble is that the research failed to influence the design process because it was done by people who never designed. They did not understand how to make the information useful to designers. Evaluation can be useful, but it has to be applicable during the design process to be effective.

Mr. Gies: As a student, I visited an architect who designed a multi-story open-plan office building. It was very innovative at the time and it won national recognition. I asked him whether he had ever been back to the building to see how the theories worked out in practice. He stated that he had been back once, when he was awarded the prize for the design. My fellow students and I studied the building, and we learned a great deal in terms of the application of that theory. We learned what was correct and what was incorrect.

Prof. Clipson: One can learn from such studies, but evaluation can be more effective at other points in the design process.

Prof. Gillmor: In the early days of person-environment studies, there were fundamental problems. One was communication. Designers asked specialists in other disciplines, particularly in sociology and psychology, questions that either were trivial (they would not make any difference to people) or a quick answer was sought to a very complex problem. The other problem was that the social scientists were not prepared to make any predictive statements because they were desperately seeking to establish credibility with other disciplines. They were acting like researchers in the natural or physical sciences. There was also a time problem. Designers have a very short time to produce a product. The analytic processes used in the humanities take too long to give the answers needed in the time available.

Prof. Clipson: There are ways of evaluating the built environment that are more effective than post-occupancy evaluation. Architects have the skills and imagination to anticipate and represent the form of environments that do not yet exist. The fact that architects sometimes fail to exercise this power imaginatively is a problem. Recently, there was a three-day symposium at the University of Minneapolis on modes of representation. People from all over the world discussed representations such as virtual imagery, full size mock-ups, real-time gaming, and so on, as ways of anticipating the nature of an environment to be created. That, in my view, is much more intelligent form of evaluation for the conceptual stage of design. Unfortunately, we designers and researchers fail to devote much study to such techniques.

Notes

1. Schon, D.A., *The Reflective Practitioner: How Professionals Think in Action.* 1982, New York: Basic Books.

2. Bobrow, P., "Experimental Changes to the Architectural Process". *Industrialization Forum*, 1974. 5(5): pp. 9-20.

ARCHITECTURAL RESEARCH: A VIEW FROM THE UNITED STATES

Colin Clipson

I am going to begin with an example of professional culture given by Peter Drucker, the management theorist, that is instructive about what we are beginning to see as the two (or are there three or four?):

> .....Until well into the seventeenth century, surgery was performed not by doctors but by barbers who, untaught and unlettered, applied whatever tortures they had picked up during their apprenticeship. Doctors, observing a literal interpretation of their oath of not to inflict bodily harm, were too ethical to cut and were not even supposed to watch. The operation, if performed according to the rules, was presided over by a learned doctor who sat on a desk well above the struggle and read what the barber was supposed to be doing aloud from a Latin classic, which of course the barber didn't understand. Needless to say it was always the barber's fault if the patient died and it was always the doctor's achievement if he survived. The doctor got a bigger fee in either event. There is some resemblance between the state of surgery four centuries ago and the state of organizational theory recently. There is no dearth of books in the field. Indeed organization theory is the main subject taught under the heading Management in many of our business schools....." [1]

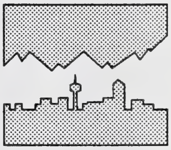
This suggests that the connections between research and practice are a problem in professional fields other than architecture.

I will summarize the history and state of architectural research in the United States, rather than define the differences between architectural research, public or private, and the practice of architecture. I do not know if such a history has been developed for Canada. It may be that you have a good view of the situation here. The profession needs a good understanding of itself if it is to improve the functional links between research and practice. Let me give you a brief picture of architects and architectural researchers in the United States.

The architecture profession is highly fragmented, which has implications for research. Robert Gutman has provided a good review of contemporary practice in the United States [2]. There are 25,000 architecture offices in the United States. Fifty percent of those offices only have 1 person in them - over 12,000 offices employ only 1 person. Of the remaining 12,000 offices, 50 percent have fewer than 5 employees, some of whom are support staff. Over 90 percent of 12,000 offices employing more than 1 person have fewer than 20 employees. Again, half or more of the employees are likely support staff. This is gives a picture of the architectural design business that has implications for research within the profession. A 15 person office may do work for an enormous corporation. How can an architectural firm, with an interest in bringing precision, clarity and imagination to its work, be an equal partner in that kind of culture, that kind of relationship?

There is growing demand for architectural services in the United States, but the work is being fed to a smaller and smaller number of large firms. There are around 250 firms that have over 50 people working for them. These include long-established firms like Albert Kahn as well as newer firms that have been established since World War II. The number of firms with over 50 people is growing. Of all fees for architectural services in the United States, 30-40 percent flow to this smaller group of firms. Robert Gutman calculates that 2 or 3 percent of the firms take about 40 percent of the architectural fees. There is a small number of, by architectural standards, enormous firms with 400 or more employees. These include SOM, HOK, and Portman Associates. These very large firms, in the year 1986-87, were responsible for the design of 700 million m^2 of space built in the United States and abroad. Further, "By 1985, the Department of Commerce, Bureau of Census, revealed that, by 1985, 200 firms had billings of at least US$10 million and 17 firms had billings of $100 million or more" [2,3].

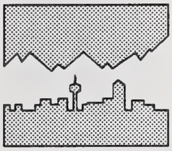
A small group of clients accounts for most of the dollar value of construction, which has an effect on architectural practices. These corporations seek absolute management precision in their operations. The pressure for U.S. business to reduce cost and remain competitive affects every part of the corporation. Building costs, time to deliver, life-cycle costs and so on have to be addressed with precision. The number of architecture firms able to compete in that environment is tiny. Clients want to reduce costs everywhere. How can architects provide the necessary specialized services with rigour and operate as generalists? Schools of architecture are still turning out people who are seen as the great integrators, individuals who can take projects of complexity and bring them together. There are still small architectural firms interested in tackling complex problems. I think the generalist model is workable, although there are serious difficulties to be faced.



Most construction projects are small. In the United States, about 1.5 million building starts are made every year. About 900,000 of those building starts are dwellings of some sort - apartments, condominiums, detached homes, and so on. The other 600,000 units are mixed - commercial, institutional, and public. Only 5 percent of these buildings are over 5000 m^2. Only 2 percent of the buildings are over 10,000 m^2. The dollar value of construction is concentrated in the relatively small number of very large projects.

What does the architectural profession, our peers, think about this? A primitive content analysis of the architectural awards made by Progressive Architecture or the American Institute of Architects (AIA) reveals that, invariably, more than two-thirds of the awards go to large projects by large firms such as SOM, Kohn Pederson Foxe, and so on.

How did the idea of the architect as the great coordinator originate? At the turn of the century, when architectural practice was being codified in the U.S., this was a very influential idea. The architect would be the mediator between all parties involved in building. This faded during the Depression when about 90% of all architects in the U.S. were unemployed and scattered into other fields.



Walter Gropius is credited with introducing the revolutionary idea of having teams of students work together on complex projects when he arrived at Harvard in the 1930's. These teams were to examine all the discipline-specific concerns pertinent to a project. It became a characteristic of Harvard teaching, and thus had a considerable influence on other schools and on practice. Whether due to the influence of Gropius and Harvard, or due to other influences, this model has remained pervasive in architectural education.

How disconcerting, therefore, to find that this model is constantly violated by the "stars" of American architecture. They are not sensitive about this; they freely declare before audiences that they are happy to relinquish development of details to another architect. Michael Graves has gone so far to say that many of his clients insist that another architect be employed. He says this is fine; these architects are interested in dealing with certain parts of technical development. They recognize they are hired to deal with change orders, the delivery of the building, and performance concerns. This situation reflects the desires of clients. Producers want a differentiated product, whether it is cars, high-fi equipment, or any other consumer product. Clients have recognized in recent years that architectural styling creates a highly differentiable product.

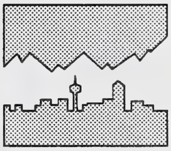
The view of architecture as image has affected the role of the architect. In the Sunday New York Times, one can see one or another of certain distinguished architects in advertisements for clothing or shoes. Consumption of style is something that we find pervasive not only in consumer disposables, but also in architecture. We have to understand this phenomenon. What is happening to professionals who at one time prided themselves on being the integrators, the experts on design from conception through construction? Will this be merely a short phase of professional behavior?

What is the state of American schools of architecture? Despite the economic depression of the 70's and 80's and the crisis in U.S. business performance, there has been a boom in enrollment. In 1960, there were around 30,000 students, while in 1980 there were 56,000. There are approximately 80 university-based professional programs. Recent studies by sociologist John Cullen show enrollment in architecture outstrips that in any other professional programs, including law and medicine. In fact, American medical schools have been reducing enrollment due to lack of demand for their graduates. The University of Michigan medical school has cut enrollment by 25 percent, while our architecture school is growing. Enrollment in schools of architecture is generally still growing. John Cullen is investigating the reasons for students being attracted to relatively low-paying work with questionable control over the outcome.

Typical applicants are creative people who realize, in high school and the early stage of their college education, that they want to exercise some autonomy in the way they work. They want to be personal explorers. The perception of young people is architecture is more secure than the fine arts. Cullen has found that many American students of architecture come from an art school background or a dance background or some other undergraduate program in the creative arts. Cullen believes students choose architecture because it is a good outlet for their creative need [4].

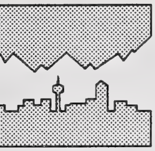
There are 16 doctoral programs in the United States. Most were initiated between 1965 and the early 1970's. The usual areas of study are history and theory, building technology, and person-environment relations. From statistics issued by the schools, I have calculated that about 400 people have completed Ph.D's in the last 25 years. Few are in practice, most are in academia. Some of the schools of architecture have formed a consortium called the Architecture Research Centres Consortium, in which more than 30 schools are involved. They collaborate on research in such areas as energy systems, computer-aided design, transportation, and facilities for special user groups such as the elderly and children.

The American Institute of Architects (AIA), which closed its own research corporation in the late 1970's, started the Architectural Research Council in 1982. It has no connection with the Architecture Research Centres Consortium. It operates in parallel, promoting the advancement of research and the dissemination of information to the profession through sixteen major committees that deal with practice, design and management in architecture.



Architects in practice and in academia have different concerns and different priorities. The Research Conference at the AIA convention in Los Angeles some five years ago had similar goals to this symposium. The idea was to bring together several hundred professionals and researchers to discuss research. It was evident that they are two different cultures. They research different things. The top research priorities of the practitioners who came to Los Angeles were litigation, codes, building failures, and fire-related concerns. The academics' priorities were theory, history, and person-environment relations. Nonetheless, some areas of mutual interest emerged. For instance, both researchers and practitioners were interested in the problems involved in refurbishing the Statue of Liberty. Another presentation which appealed to both groups was given by a young researcher named Feliz Ozel. She presented the results of a wonderful study of building fires and human behaviors, gathered from episodes occurring over many years. She compiled information on smoke movement and the movement of building occupants, and modelled this in a series of computer simulations. She had the mixed audience of practitioners and researchers on the edge of their seats. However, most of the time we had two groups of bored people.

To complete the picture I am creating,



it is necessary to consider the building industry itself. It is the most highly fragmented industry in the United States. It includes many different interest groups - manufacturers, suppliers, building trades, engineers, and so on. There are one million general contractors in America, 50,000 consulting engineering firms, 25,000 building materials dealers, 15 major building and construction unions, 7,000 locals, 108 construction-related trade associations, and 10,000 building code jurisdictions. The building industry has the lowest investment in research and development of any American industry, around 0.33 percent of gross revenues - the automotive industry invests around 4 percent of their its gross revenues in research, aircraft companies 5 percent, and computer companies 8 percent.

This gives us an idea of the culture in which architectural research and practice has to operate. America, like Canada, is facing strong pressures from overseas competition. The U.S. has occupied a dominant position in world trade and production since the end of World War II. It ought to account for a lower level of world trade, probably something like its pre-war level, and it would be desirable to make that transition gracefully. Most of the research done in such an environment is incremental; there is little fundamental change. This symposium is addressing barriers to architectural research. The building industry in the U.S. is a house divided, each group is a constituency doing the type of research that meets its own needs without any overall direction.

I have been asking people today whether there was a tradition in the 60's and 70's of the practitioner-researcher that no longer exists? There were several such practitioners: Phil Bobrow, Jim McKellar, Ezra Ehrenkrantz, Mike Brill, John Weeks, Kaplan McLaughlin and Diaz in San Francisco, and the Zeidler group. There are exceptions like Dr. Rolfson who returned to practice from doctoral studies. Am I wrong in thinking that the socio-technical circumstances or cultural circumstances have changed, and that we do not have a new crop of researcher-practitioners? I believe there was a period when financial support was available for such work. There was an attitude that made this possible.

One of the things I mentioned was market demand. Most architects pay little attention to it. The market is clients, people who spend money on buildings and demand certain things from the architectural profession. Contemporary projects are complex and have to be realized at an extremely competitive cost. They tend to sell image, to which we have devoted insufficient thought. There are many actors involved in these complex projects. The clients require a degree of control which has not been commonly exercised in architectural practice. There is no understanding or empathy, projects have to be done in a certain way. That is the world in which architects have to compete.

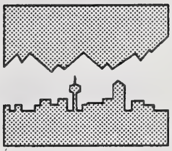
Designing is as much a "hidden dimension" to architects as it is to many of the clients who build America. It is a very under-researched, misunderstood activity. Groups other than architects are currently doing the most extensive investigations of the design process. Computer, aircraft, automobile, and other manufacturers around the world are extremely interested in all aspects of design: styling, intuitive processes, and systematic design methods. They are spending huge amounts of money on the study of design.

A report recently commissioned by a consortium of Silicon Valley computer companies traces the development of design methods. It begins with a discussion of the work of the people I have mentioned - Jones, Archer, Alexander, Esherik - and moves on to the work of Winograd, Flores and others working on expert systems. The authors of the study found it necessary to retrace the investigations of architects in order to discuss design. Why are they studying design? They realize that effective conceptual design is the key to manufacturing products of high performance and quality within close margins in the engineering and development stage of the project.

We should keep in our memories the story of Demming and Duran, the statisticians and operational scientists who developed statistical process control in the 1940's and 50's. They tried to tell American industry about it, but nobody listened, so Demming went to Japan. He is now a cultural hero there. There are statues of Demming in Japan. It was Demming who first did longitudinal studies of manufactured artifacts showing that 60 percent of the faults in a final product are traceable to design. He saw that as an important finding rather than as a poor reflection on designers. It showed that design is the key to translating inventions and ideas into artifacts. That view now permeates a great deal of European, all Japanese and Korean, and a small amount of American thinking about design and production. The concept is referred to by such terms as "design for manufacturing" and "concurrent engineering." In architecture, the equivalent would be to study the links between design development and construction. There are direct relationships among design, construction, and the quality of the final product.

The industrial research to which I refer is not restricted to computer methods. Most private research centres, and some government ones, including NASA, have human performance and expert systems side-by-side. They adopt the classic human factors view that one cannot develop one without the other. Industrial research on design, where it is being supported, is being developed through a very theoretical examination funded by long-term investment into the nature of design. People in Silicon Valley are holding high-level private conferences on ways of examining the design process. They are employing many researchers to investigate this topic. I suggest that, today, architectural researchers are in a backwater. We should examine research efforts in other fields. These other efforts are very significant. Architects are in danger of being left out.

There is a new research initiative taking place in the United States. Hundreds of millions of dollars are being invested in what is being called a National Co-laboratory for Science, Technology, and Engineering. The idea is to link the practice of engineering and applied science with academic institutions and other centres of excellence to share information about technology transfer, innovation, and so on. I have examined every sub-committee list; despite the importance of the built environment, there is not one architect among the several hundred people who are involved.



No national body promotes designing as central to the culture **and** economy of the United States of America. The AIA does not do it. Can you imagine the American Medical Association securing any research funding, whether for heart disease in the 60's and 70's, cancer in the 70's, or AIDS in the 80's, without lobbying? We live in a political culture in which finite resources have to be allocated. How can architects impress upon politicians and the voting public that architectural design research is important? Is it beneath us to lobby for design and architecture as activities that are important to the national well-being? Some American architects think so. They think it smacks of marketing, of "dirty" activities. However, it is beginning to dawn on the AIA and various interest groups in the building industry that lobbying is essential to convey the importance of design to society. It cannot be done through institutions of learning alone.

A number of things are delaying this effort in the U.S. Herb MacLaughlin, an eminent practitioner-researcher has said that his forty years of experience in trying to get architects involved in research have taught him that most architects do not like people tinkering with the way they work. They see researchers as people who tinker. They like some peripheral research, but they do not like the fundamental questions that good research raises. Academics are burdened with the priorities of the university culture, the production of publications. Young students are shaped early by this culture. I can think of no other reason why so few architects exploit research in practice. The lack of involvement of researchers in practice is a serious problem. I am reminded of Oscar Wilde when I think of some of the people I work with in academia. Wilde said of a prominent aesthete of his time "...he knows all about art but he doesn't know what he likes." Architectural research should be more closely linked to practice. We should experiment with a wide variety of approaches to architectural research with eventual practice in mind. Researching should be an integral part of the process of designing.

Notes

1. Drucker, P.F., *The Practice of Management.* 1954, New York: Harper and Row.
2. "500 Growth suffers a few setbacks" *Engineering News Record,* May16, 1985: 61.
3. U.S. Bureau of the Census, *Census of Service Industries*, Washington, D.C.,1972, 1982.
4. Gutman, R., *Architectural Practice: A Critical Review.* 1989, Princeton, NJ: Princeton University Press.

PANEL: RESEARCH AND DESIGN - MAKING EFFECTIVE CONNECTIONS

Gerald Rolfsen, Dale Taylor, and Alan Tregebov

Dr. Rolfsen: A question asked yesterday was, "Does anybody's practice have a research person in it?" Our firm, Advance Planning and Research for Architecture (APRA), usually employs six to eight in offices in Vancouver and Edmonton. Our experience illustrates some important points about practice and research. We do programming, strategic planning for institutions of various kinds, service delivery planning, and a very minor amount of urban planning.

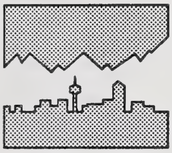
In the late '60's, my partner and I left architectural practice to go to graduate school. We had earned degrees in architecture at the University of British Columbia. After six years working on our doctoral studies and in the Architecture and Planning Research Laboratory at The University of Michigan, we returned to Canada in 1974. Canada Mortgage and Housing Corporation (CMHC) had supported our studies with scholarships, so the first thing we did was to visit CMHC in Ottawa. We said, "Well, here we are. Thanks for all the money you've been sending us down there in Michigan for the last six years. Now that you've invested all this Canadian money in our education, what do you want us to do?" They did not seem to want us to do anything.

We abandoned the cocoon of academic life to establish a private sector clone of the Architecture and Planning Research Laboratory. Our goal was somewhat mischievous. We wanted to find out whether we could operate a private sector practice without being involved in traditional design activities, and this without the cushion of academic salaries.

The problem with being a researcher in the private sector, winning consulting contracts in competition, is that the extent of research required on a project is usually underestimated. It is very difficult for professionals with our orientation to have an adequate programming effort included in projects. Many of the decisions about the scope of research are made prior to the proposal call. Because time is typically of the essence in contracts for such work, the investigations have to be very limited.

Being in the private sector, we have to be very flexible. We have acted as prime consultants in determining the feasibility of building a ski village on top of a garbage dump, 130 km north of Vancouver. That place is called Whistler now. We have done personnel and security planning for maximum security prisons. We program high containment virus laboratories.

We have to regard not only public sector bodies as our clients, but also the rest of the architectural profession. We walk a thin line between these two groups and try to remain on good terms with both. Although we are very interested in design, and although the purpose of our professional life is to inform and improve design, we have to be very careful about our relationships with our colleagues. That is why we do no design.



In forums such as this, I refer to our work as "pseudo-research." In the monograph quoted in the appendix of the Shadbolt-Carrothers report [1], I also called all the research done at the master's level pseudo-research. While I cannot define real research, it is not what our firm does. I think that, in most universities, real research is difficult to carry out below the level of a doctoral program.

The "cottage industry" image of the American architectural profession that Prof. Clipson portrayed last night applies to Canada. We have the same problems finding a "critical mass" of architects who could mount a research program. In my opinion, the profession's priorities are:

1. Media and communication strategies aimed at raising the profile of architecture in the cultural and economic life of the country

2. Definition and codification of the building process, basically, a description of the roles and responsibilities of all the actors involved in building

   There is tremendous confusion about responsibility for certain parts of the building process. This can be dangerous, as was exemplified by the collapse of the roof of a large store in Vancouver about a year and a half ago. The fragmentation of the management of construction is a serious concern to the profession. We are working to get our provincial governments, who control the profession through legislation, to clarify the roles of the actors in the building process.

3. Research on building codes, including research on interpretation and application of the code

   The profession is often criticized these days for a relative lack of sophistication in understanding the finer points of building codes. I think that criticism is unjustified in many cases, but it cannot be ignored.

4. Research and development on legislation, to help us understand what our responsibilities will be with nation-wide reciprocity in the architectural profession

   We need to know what to do about inter-provincial conduct problems. One of the major roles of the profession is to govern itself according to a code of conduct. This includes discipline of architects who violate the code of conduct. Difficult problems can arise with registrations in more than one prov-

> ince and with inter-provincial moves. For instance, should there be a domino effect in licence removal, if that sanction is applied to a professional in one province. It is a difficult issue, further complicated by free trade. Reciprocity is being extended south of the border, which will lead to legal and political problems.

The Shadbolt-Carrothers report includes a description of all the university-based programs in architecture - programs available, planned programs, projected needs. I did not find the words, "Programming, Pre-design, or Research" anywhere. That scared me. Does it mean this type of work is not recognized as having principles or methodologies that are communicable or knowledge-based? I would like to know why these aspects of design were not included. Admittedly, person-environment relations is a difficult subject to teach. I know, because I have tried. A lot of material is available: theory on human factors and environmental psychology, case studies on defensible space. Students find this interesting, and they are interested in the practical guidelines that research can generate. Design studios in universities do not apply this knowledge in evaluating student work. As a result, even if one is able to make connections in lecture courses, the concepts are not reinforced in the design studio, which is the primary setting for learning. I have a lot of sympathy for our schools. The Shadbolt-Carrothers report points out that education focuses on conceptual and schematic design and on design development. The profession tends to push the schools to deal with contract documents, tendering and procurement, construction, and commissioning. I think schools have to put a greater effort into studying, and teaching about, the connections between design and behavioural research.

Programming describes, in language, very complex aspirations, intended meaning, and processes that are attached to building. It is almost impossible for non-designers to write that kind of language and make it intelligible to people who are going to use it. Sociologists are ineffective in pre-design planning. We need increased involvement of architects in programming. Identification of user needs is very important in building design, especially if we want to create a rational or cyclical process of evaluating buildings. One of the problems with post-occupancy evaluation is that it has always been difficult to trace problems back to their roots because architects tend not to record their objectives.

I learned to do research by writing proposals when I was a graduate student at the University of Michigan. We did little research in the early days in the doctoral program because there was little funding. We did learn how to write proposals. That exercise teaches organized thinking about innovative methods to solve architecture problems. The value of this exercise should not be underestimated. My experience has been that the typical architect does not know how to write proposals. The programming industry, if you will, or the research industry, can make connections with designers by collaborating with them. My firm enjoys working with many different architectural firms on joint ventures to provide comprehensive services to various kinds of clients. We collaborate on proposal writing. This is an important way of making connections between design and research

Few publications deal with the problem of connections between research and practice. None of them are first-rate, but Deasy's book is a reasonably good example [2]. It is a sort of primer on person-environment research. It was written by an architect and architects find it easy to read. Our profession should create more books that make research-based information more accessible to practitioners.

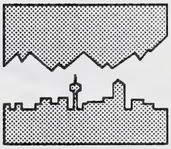
Prof. Taylor: The conclusion yesterday was that, generally speaking, architectural research has not been defined, and probably cannot be defined. If one must formulate a definition, it is probably so broad as to include anything. Very little was said about practice, but the implication was that a definition of practice today will probably be outmoded tomorrow. There seems to be a feeling that the nature of practice must change. By the end of the day, I had the sense that I did not particularly know what architectural research was and I had very little idea of what sort of a practice I was supposed to connect this to. Given that my presentation today was supposed to make a connection, it required little effort to see that by late last night I was in deep trouble.

It occurred to me that I might be saved by the fact that nobody speaks to the topic. That was confirmed yesterday. People come to these gatherings with a particular point of view. While the topic of the meeting might lead to some modification of their text, they basically state a position painstakingly developed over a period of time. I will probably be no exception. I decided not to spend any time trying to develop, in a systematic way, definitions of architectural research and practice that would then allow me, in the orderly research way, to make the connections clear. I did decide, however, that I would communicate my own understanding of research and practice. Practice can be viewed in simple terms as design within a management structure.

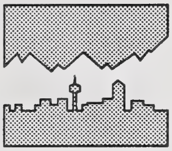
I started with a standard definition of research as systematic inquiry directed towards the creation of knowledge. The knowledge has to enter the realm of human activity to become understood and meaningful. I also wanted to include the idea of critical thought, so one might say that research is systematic inquiry, directed towards the creation of knowledge and critical understanding. My definition does not include the seemingly random efforts that simply "re-stir" existing knowledge. To me, the words "systematic" and "creation of knowledge" are the important things. This completes the view of research and practice that I have adopted and will use to structure my comments.

I will not deal with what I call "quick fix" connections, although I must mention them in passing because, unfortunately, they seem to be an expectation of a large number of architects with respect to research. We heard yesterday, and, at the university, hear continually, comments like, "I looked at some research once, but I can't read that stuff; I don't have time to do that; I just want to know the bottom line, I don't want to go through all that kind of stuff." I have the sense, and, indeed, some experience, that many practitioner demands for research are crisis-driven. A situation arises where a practitioner needs to know something, and needs to know quickly, for a good reason. We get phone calls of this sort at the university. The manner of the callers is casual, although you can tell by the edge on their voices that they hope you have the answer today and not tomorrow. For the "quick fix" individuals, I guess there are a couple of possible responses. We could encourage the inclusion of appropriate architectural details on the back of milk cartons, so that architects could be informed about the latest things they ought to find useful in their practice without cutting into their office hours. Another model is the convenience store; crisis information would be available, but it would cost. If you really need chocolate fudge icing for a cake at 11:00 at night, you can probably get it at the convenience store, but it will cost you three times what it would at a major grocery store. Personally, I think the crisis model is a poor way of linking research and practice.

I will discuss possibilities that assume a genuine desire on the part of practitioners to improve the quality of the environment to which they contribute through a greater understanding of the world and their obligations. Practitioners of that mind are prepared for, and interested in, research. They are prepared to spend the time necessary to develop research. Therefore, my suggestions will deal with longer-term and, consequently, more general matters. I propose six actions, the last two of which are variations on the first, to make effective connections between research and practice.



The first action is to create what I, and somebody in Snyder's book on architectural research [3], call the discipline's "map" of the world. Most disciplines have developed a framework in which all of the activities in the world are located in a particular way. They are located relative to that discipline's view of the world. I propose that architects begin to construct a map of the world according to architects. This is consistent with the arguments by Dr. Baniassad and others regarding the necessity of adopting an architectural perspective in our thought. The value of such a map of the world is that events and achievements can be located on it and related to the interests and location of a member of a discipline. For instance, while an individual chemist may work in a particular area and have a great knowledge about the terrain in the immediate vicinity, the chemist also has a general understanding of the world according to chemists. The chemist can easily place the work of a colleague working in a different subspecialty in relation to his or her own, can assess the terrain in between, and can determine the directness of the connections that can be made. Such disciplinary perspectives on the world make it possible to plan intellectual expeditions. If the explorers get lost, the map provides a way to get home. Research in a discipline benefits from the efforts of many individuals toiling in various sub-areas of a discipline. The researchers feel less lost when they have a general framework in which their work can be related to the combined efforts of the discipline. We should begin to construct a map of the world according to architects. It would provide a common understanding of issues and efforts.



The second action I propose is the development of a research culture. The seeds of this culture should be planted in the schools, because that is where prospective architects develop their initial attitudes and views of the world. One aspect of this research culture, of course, would be that every person entering the profession would know their geography. They would have an understanding of the map of the world according to architects. After graduation, some would indeed become researchers in the specific sense. One thing that might also happen, if we develop a research culture, is that each architect, engaged in private practice or other work, could begin to develop a personal view of research. That would include the idea of research, as some describe it in Snyder's book, as thoughtful design or reflective practice. All that is required, basically, is that architects develop an ability to record and to refer to things they have done before, and that they reflect on these things.

These skills of reflection have not been cultivated by all architects. Indeed, some architects actively avoid the development of such skills because they are afraid that their intuitive faculties, which they think are essential to do design, will be smothered by any conscious attempt at understanding. Architects should learn to see research not only as a major, organized, and funded endeavour done by full-time researchers, but also as a method of reflection.

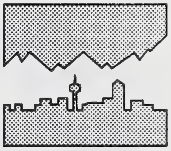
I agree that architecture and architectural research may differ in significant ways from the work that other people do, and that we have to include the concerns that were raised yesterday. On the other hand, I think architects must become, in support of a research culture, familiar with society's views of research, other disciplines' views of research, and how these views are relevant to architects. The importance of this can be demonstrated by considering my experience in reviewing proposals for a provincial body called the Alberta Environmental Research Trust. It awards monies to support research on the environment. The environment has been defined variously over the years, from water and air to built environments. Architects do not fare well in the review process. One of the problems may be the scientific bias of such groups. On the other hand, the reviewers have some reasonable expectations that architects often fail to meet. The application form has the following sections: 1) a description of the project, 2) objectives of the study, 3) the methods to be used, 4) the relationship of the proposal to other research, 5) the personnel and their contributions, and 6) the budget. The problem for architects might be that the reviewers' expectations regarding responses to these headings do not fit architects. On the other hand, we could see the reviewers as asking, "What do you want to do? Why is it important? What is the present state of knowledge in this area? How would the proposed work relate to other concerns? How are you going to do it? Do you have sufficient resources?" Some of the unsatisfactory answers come from other disciplines, but architects are certainly in the forefront.

Architects generally seem to be oblivious to research by others, oblivious to the need to show that the proposed work is not redundant. This relates to my use of the words "the creation of knowledge" in my definition of research - not just stirring it around. Quite often, architects have no understanding that there is an existing body of information, possible hard to find, which must be known before it is possible to decide whether a research project is legitimate or a waste of time and money.

The "methods" section causes problems, partly because the funding agency fails to understand that there are methods other than the ones with which they are familiar. On the other hand, architects are not very good at describing their methods of enquiry.

The reason reviewers evaluate proposals is to decide whether the applicants know what they are doing - whether there is any prospect the applicants are going to be able to execute the project and whether the project will contribute to an increasingly detailed mosaic of knowledge of the world. Many of the criteria used by funding bodies, which may not understand architecture specifically, are not unreasonable. It is not unreasonable to expect architects to know how to write proposals and to know enough about research to be able to answer all these questions.

Problems arise when architects prepare budgets for research projects. The reason for having a budget is to answer the question, "Will these people have enough resources to do that work?" It is not unusual to have an architect suggest that a proposed project will "spin-off," out of a job that they are presently doing, such as a group home for alcoholic natives, a general theory of social behaviour and social justice and what-not applicable to a broad range of people (this is a real example). In the example, the proposed budget was about $10, 000. We asked the applicant, "How are you possibly going to do that?" His response was, "Well, my wife's going to do the typing." The granting body loses all confidence in the ability of such applicants to execute. We have actually phoned up applicants and said, "This is really a great project. If you phone so-and-so, because there is one resource you lack in your team that is critical and triple your budget from $20,000 to $60,000, then we'll consider it." They have no understanding. They think that they are in a competitive bidding situation - they believe that if they can do a project for $10, 000 when somebody else is prepared to do one for $20,000 that they will get the grant. So, architects are poor at this process. Part of of the problem is the need to establish a research culture. If they understand the game, they will be able to play it a lot better.



The third area that I think we need to develop is reflective practice. It is essential for architects to cultivate the ability and inclination to be reflective about their work. One of my students, whom I thought was a very sensitive person, went to work for a local office. About a year later, I was chatting with him about his experiences, which he enjoyed very much. He saw no dichotomy between the academy and practice, but he made a revealing observation. He remarked, with respect to fellow workers, that these people did not read. It was difficult for him to have a discussion with them because they never read a book about anything except, occasionally, architecture. They read the "glossies", but they were not in a position to have substantive discussions about concerns that are important, albeit somewhat peripheral, to architecture. That is a sad state of affairs. I think it is, to a certain extent, encouraged by schools. I went through a great period in my architectural life, having entered the architectural milieu, which was primarily visual and imaginative. For a long time, I did not read unless I really had to. The profession has to develop and value reflection and understanding of other people and other disciplines.

This brings me to my fourth, and probably the most - if not important, at least relevant - point. Prof. Haldenby has argued the importance of the development of discourse. We need mechanisms to generate useful and meaningful discussions about the questions of architectural questions - discussions of the theoretical and the applied, discussions between the academies and the practitioners, as much as these are separated. At the next conference, and this suggestion was made by Dr. Baniassad last night at dinner, everybody should come with their work and show each other what they are doing. We need to avoid the problem that students have at an early point in their architectural studies, the great fear of putting their work on the wall. They will talk about it endlessly, rather than put it up, because they know that something will be wrong with it. There will be a weakness. Somebody will criticize them. The professors convince them that anything they have done has value. Once the students are convinced, the professor "ambushes" them by convincing them that, while it may have value, it lacks enough value to deserve to exist on the wall. Then the professor convinces them to not worry if their idea is thrown out, because there are all kinds of ideas where that one came from. The teacher develops their confidence in their ability to be critical about an idea and also in their ability to throw ideas away, if they fail to meet the critical criteria, and to develop others. Architectural research, to an extent, is at that stage. People hesitate to bring their work forward because they fear ridicule, but we need discourse and we need debate.

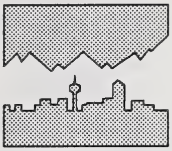
My fifth suggestion is that we create teams of individuals who individually excel at one thing, like design, but who are weak at other things, like explanation. Then we could develop a process of issuing, collectively, really meaningful design work accompanied by explanation and analysis. In our Faculty, we are beginning to develop a way of allowing practitioners to take research sabbaticals at the university. We want to make it possible for them to leave their practice and come to the university to pursue ideas without being burdened with degree requirements and other such baggage of formal education. This professional sabbatical and university connection might allow those people within the university who have the interest and ability to make practitioners' ideas more understandable to others. This would be an important aspect of discourse.

In our Faculty of Environmental Design, I have lately found great opportunities for both research and practice in the area of the environment. It is not just that we have a responsibility that many of us, including architects, have struggled with over the years - lately we have had a great opportunity with respect to the environment. There are two things that we can do as a profession in this area. They both relate to the idea of the world map, the world according to architects. I think we have to deal with the idea of our world map in two ways. First of all, we have to enlarge our world map. We have to take our map and enter onto it, clearly from our point of view, all of the landmarks that are important to other disciplines. These landmarks, related to our concerns, could be used to structure our view of our world.

Yesterday, Prof. Tregebov made an impassioned plea, with which I agreed, for us to continually review what we call progress and decide whether it is in the best interests of society; this leads me to the topic of sustainable development, which is the current "hot" issue. Formerly, many arguments were made in favour of "no growth." That was a difficult position, particularly for architects as one of the tenets was that we ought to stop building. Architect were to stop practicing their trade because we were making things worse. There are many problems with that position. Sustainable development acknowledges that the world still has some room for environmental and social development. It recognizes that people in less-developed areas should be able to bring their standard of living up to a better and more reasonable level - not the Beverly Hills lifestyle, but certainly adequate in terms of health and mobility and quality of life. They have the right to do that. It is now widely accepted that development should be allowed to continue, but only within the rules of sustainability. I think that architects need to acknowledge these issues and make broader connections in our map of the world, which brings me back again to my sixth proposal.

The corollary of my last suggestion is that we should actively begin to put architecture and architectural concerns on other people's world maps. We have to actively do that because if others are like us, it will not be done voluntarily. We must be able to articulate to other disciplines, with their particular views of the world, the value of architecture and the kinds of issues that are architecturally significant.

I think that the environment will be the political issue of the '90's, which can be both good and bad. The good thing is that there is much truth to the environmental concerns. The sooner we address these problems, the better. The other good thing is that architecture is part of the environment. Architects have thought that for a long time. What we have to do is to convince others that, while public concern has been focused on rain forests and rivers and animals, the quality of the built environment is as important as those natural things. When society puts its resources into environmental quality, that effort should include the quality of the built environment. Architects are prepared to contribute to that.



As we discussed yesterday, architects also have to convince people of the value of design as a method of enquiry. Once other people begin to see the particular contributions that architects can make by virtue of their way of working, then we will be recognized on other world maps. Our world map will be enlarged by acknowledging our inter-connectedness with others. Once we have managed to do that, the opportunities for research and the connections between research and practice will allow us make great advances.

Prof. Tregebov: I wear two hats, one as a professor of architecture at the University of Toronto, and the other as a partner in a practice employing 12 people in Toronto, a practice that aims at a high level of quality in design. The two roles have a complementary relationship. I am able to draw upon one set of experiences when doing the other job. There are resources available at the university that would not be readily available to most practitioners. My work currently involves a range of what I will loosely categorize as research. I would like to present my thoughts on two aspects of architectural research: 1) the crisis of publication and dissemination of the research undertaken and 2) the issue of design as a form of research.

On the one hand, I am involved in projects at the university that are extending the boundaries of our collective knowledge. For example, I am working with a Ph.D. candidate who is investigating the process of reading architectural drawings as a study in cognitive science. At some point in the distant future, this work will contribute to architectural education, although I find it immediately beneficial.

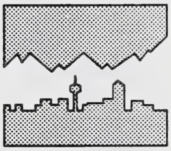
On the other hand, another type of research consumes much more of my life. This research does **not** extend the boundaries of knowledge. It is an investigation into issues and probable solutions, and is much more akin to **documentation and bibliography**. I think this is a valid endeavour. Much published work is full of ideas needing to be organized so that the current state of a particular issue can be understood. It is necessary to collect information, sort through it, and find that which is applicable to design, whether in school or one in the office. In our office, we tend to use three kinds of information: design-related material, technical material, and management-legal material. The design-related material is most important to our practice, but I will discuss it after the other two. We have a loosely structured approach to incorporating knowledge created by others into our work. It is time-consuming and difficult.

On the technical side, we face what seems to be a crisis. We subscribe to a number of journals, bulletins, and documents disseminated by building code commissions, life safety bodies, research councils and so on. We have one person who is responsible for reviewing that material. The same person goes to a number of seminars, whether they be on air barriers, rainscreen walls, or whatever. It seems that every month there is a seminar on some worthwhile topic; the quantity of information is overwhelming. We have follow-up meetings so the staff can be informed about the important points. This requires us to time out of everybody's schedule. Our staff need to know what knowledge is available so they can refer to it if the topic comes up in the course of a project.

Another type of information upon which we draw is in the management-legal area, which includes official plans and zoning controls of all the municipalities we work in, building codes of all the jurisdictions in which we work, problems related to liability, cost control measures, building code commission rulings, and other issues pertaining to professional practice. This area is usually covered by one or more of the partners, who then shares the knowledge with the others. We cannot all attend all the seminars; there would be no time to do any work.

Information related to design is most important to us; this is not limited to current work or publications. We continuously develop our library with materials pertaining to the history of architecture and urban design. These are not necessarily related to any particular project when they are acquired. I find that my academic career proves very helpful in this process of becoming familiar with resources that are **out there.** I learn about current interests of other professors and of students - what they are reading, their latest projects, what ideas are really provocative.

Design is the leading activity in our practice. Since we formed our corporation three years ago, we have completed about 120 projects, only about 30 of which resulted in construction. The rest are planning studies, feasibility studies, and so on. In all this work we tend to use **design as the method of investigation**. Quite often, we are asked to examine potential sites, and determine which is best. We tend to start with design. **Design precedes analysis or data collection**. We feel that we cannot collect data or analyze anything unless we know what we need. If one thinks one is looking for contextual relationships and begins to document neighboring facades, one has already jumped to the assumption that these are important. If one begins with certain environmental factors, one has already assumed that these have a role to play in the selection of the site. It is our view that the selection of data and analytical techniques depends on the design response to the problem.



We make it explicit that we have preconceived ideas about architecture. We have preconceived but developing ideas about history and urbanism that underlie our work. This may involve establishing a hierarchy to the issues or determining the characteristics of the range of solution types in which we are interested.

The role of **design as research** is not limited to projects but even includes proposals for professional commissions. When putting together proposals for architectural commissions, we tend to go through a design process as a way of defining issues. We also get interesting and interested comments from institutions and agencies, to whom we submit proposals, as a result of the thoroughness of the proposal exercise. While these may not necessarily result in a commission, the analytic work resulting from design probes is often appreciated. As a result of our approach, the outline of the proposal is often put into projects at the programming stage. It is somewhat satisfying because, even if we do not get the job, much of the background work sees fruition. While it is frustrating that we do not get a fee for this work, there is always the potential of inclusion on the next "short-list" for future projects.

The production of this design work involves a number of people in the office. We always have one to three students or recent graduates working in the firm. Quite often, they lack the experience to produce construction documents. What they have, coming fresh out of the schools, is a fresh insight into current, concerns in architectural design. Typically, they have an interest in current and historical literature. They spend time either in our library, in the university library, or in the field. They prepare background reports that we can then use as a basis for design proposals.

The process of design often involves research of the type I referred to as documentation and bibliography. An example of our process was the recent design of a new fire station for the island communities in Toronto harbour. One person researched small fire stations built over the last hundred years, while another person investigated the architecture of the Toronto islands and the traditions of building on these islands. This was concurrent with the typical process of developing a functional program that interpreted the operational needs of the fire department. Design was a critically important process in our investigations. Another recent project was a combined ambulance-fire station to be located beneath an expressway, a 1950's overhead arterial. Some of the initial problems that we had to consider were technical. How does one build when salt contributes to the decay of the overhead structure and would drip on the roof? How does one plan for future traffic patterns? How does one put these two different agencies that are controlled by different levels of municipal government together underneath one expressway? How does one deal architecturally with problems of jurisdiction, ensuring clear identity for the different agencies? There is, for us, a certain amount of design involved in studying all these rather fundamental concerns.

For the conceptual or schematic design aspects we examine historical precedents, contextual issues, and morphological patterns. We draw upon resources at hand or else set assemble the required information. On the technical side, we cannot directly employ our library materials. This is where many of the people in this room are critical to our ongoing work. We need technical reports **framed** to assist us in questions of practice.

There are certain design documents that we we use over and over again. These include materials such as Roger Sherwood's *Modern Housing Proto-*

types [4], the publications on the IBA building exhibition in Berlin, Michael Dennis' and Klaus Herdeg's unpublished *Urban Design Precedents* [5], and Wayne Copper's work on urban design [6]. There are other materials we also use frequently, such as those resulting from our above-mentioned bibliographic research into areas such as building types. We find this extremely valuable in professional practice. It saves us time that allows us to begin addressing the technological problems. We do not have the same type of access to research into such technical concerns such as the performance of a wall type or material assembly. A coordinated publication documenting critical sources or publishing studies in a form accessible for professional work would be most appreciated. More as a practicing architect more than as a professor, I take this opportunity to call for a new publication which could, in fact, be a result of conferences such as this, a concise but thorough reference to recently completed or on-going research in Canada. It would include the bibliographic and documentary information to which I earlier referred as well as more theoretical research.

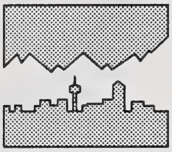
Discussion

Dr. Friedman: As a professor of architecture, people ask me "Should I be an architect?" and "What do architects do?" I explain to them, that, on one hand, architects want to be artists - to be able to sketch, to design, to conceive, to plan - and on the other hand, architects want to be scientists - to know how wood works, how metal bends, and how to calculate the size of beams. They always become confused and ask me, "Can these two qualities be developed in one person?" I cannot answer it myself. It is a basic question.

We, at this symposium, want to encourage research which involves tools and methods that are not commonly used in the teaching of architecture. We would like architects to think systematically. We would like to disseminate the knowledge created by architectural research to practitioners who think of themselves as artists. Firms like those of Mr. Lincourt and Mr. Bobrow are rare specimens in the profession. Few architectural firms do research.

I believe that even if we trained students in research, this would not be valued by the profession because architects see themselves as artists, as people who are supposed to create poetic visions. Functional problems are considered secondary. I think that we have a contradiction. On one hand, we want to do research, which is more scientific. On the other hand, we have a concern with architecture, which has to do with artistic problems.

Mr. Bobrow: I believe that universities and practices should have different roles in architectural research. Universities are not equipped to do applied research because they lack project information. For instance, they lack the basis for improving cost performance. On the other, practices are not very effective in theoretical research because they do not have staff with the appropriate scholarly skills.



One of the ideas that we ought to be considering is whether a combination of practice-based applied research and university-based theoretical research should be the model for building a relationship between professional and academic work. In considering ways to improve buildings, our practice does not make the distinctions raised earlier regarding theory and application. We have to deal with both poetic and functional aspects of design. If anything, the problem is one of emphasis.

What emphasis are we placing on research compared with the need? As an example, the health industry in Canada spends 50 billion dollars a year, but does not invest one cent per capita to reduce costs related to the physical environment. No funding is provided to study ways to make these institutions look better, feel better, operate better, and help human beings in a better way. One can make a well-substantiated argument that there is a need for architectural research, and a need for public sector support of this research. Consider the 3-M Corporation. It invests six per cent of its gross revenues in research. If architects followed this model, practices that exceed gross revenues of a million dollars a year would have a staff researcher. We should have, as an integral part of our team, somebody who can work on improving the work of a practice. Why is research not an organized part of our work?

We have to deal with a strong commercial emphasis in our society because office buildings are the cathedrals of today and industries are considered paramount. These buildings also cause environmental problems. Most professionals do not even know the environmental impacts of a parking lot - whether it absorbs heat, what happens to run-off , and so on. Architects lack an environmental handbook. We cannot take a design to a specialist and get an evaluation of its operation, costs, environmental impacts, and so on. We lack resources and tools to deal with these questions. Our needs are immediate.

Notes

1. Shadbolt, D., G. Carrothers, and I. Harding, *Advanced Studies and Research in Architecture: A Canadian Perspective.* 1990, Ottawa: Canada Council.
2. Deasy, C.M., *Design for Human Affairs.* 1974, New York: Schenkman.
3. Snyder, J.C., ed. *Architectural Research.* Environmental Design, ed. R.P. Dober. Vol. 6. 1984, Van Nostrand Reinhold: New York.
4. Sherwood, R., *Modern Housing Prototypes.* 1979, Cambridge, MA: Harvard University Press.
5. Dennis, M. and K. Herdeg, *Urban Design Precedents.* 1974, Cornell University.
6. Copper, W., Cornell Journal of Architecture, 2.

ARCHITECTURAL RESEARCH IN CANADA: RESULTS OF A RECENT STUDY

Douglas Shadbolt and Gerald Carrothers

Prof. Shadbolt: There are four points in "Advanced Studies and Research in Architecture: A Canadian Perspective" [1] that I wish to address here.

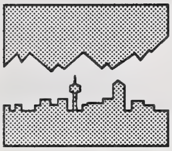
The first point is this: we believe that to understand the problems of architectural research, one must understand the process of making a building. That is to say, one must understand the distinct stages of project delivery in all their subtlety, the different objectives of each stage, the knowledge content issues at each stage, the activities, the actors involved, their separate responsibilities and interactions, technical, legal and managerial issues, and so on. These stages may be seen as:

1. Opportunity identification
2. Feasibility assessment
3. Project definition
4. Conceptual design
5. Design development
6. Preparation of contract documents
7. Tendering-procurement
8. Construction
9. Commissioning

By no means are we suggesting that any historical, social, moral, ethical, economic, or other theoretical or "soft" issue be neglected. Indeed, we emphasize that these must be considered. Project delivery is simply a framework for discussion.

Within the framework of project delivery, we believe that the key decisions affecting the outcome of the process and the quality of the product are made at the pre-design, preliminary design, and design development stages. These have traditionally been the points in the process where the architect has had the greatest influence. The architect's influence is becoming increasingly limited, but is still regarded as greatest at these stages of project delivery. Architectural research should be focussed on matters that will increase the architect's effectiveness in these areas. If architectural research is to be of any value, it has to contribute to improvement of the quality of buildings.

The second point is that research is directly related to advanced studies. To build the understanding of architecture necessary to conduct research, researchers need both a broad education in architecture and considerable experience in practice. Practical experience may or may not include becoming a licensed professional. The researcher must also learn how to do research. This is best done in a properly designed research program, under the supervision of experienced researchers. Such programs can exist only in the university environment or in affiliated practices including specialists.



In Canada, opportunities for advanced education in architecture are limited, and those that do exist are, for the most part, incomplete and sadly undernourished. Additionally, there are very few specialist professional practices in this country. None are affiliated with academic programs, as far as we know. Research will not flourish until all levels of architectural education are available in Canada, each staffed and funded to a degree that will attract high quality students who now have to go to other countries to acquire research skills.

The third point is that, in order to develop and maintain research programs, a reliable source of funding must be available. Research funding from the federal government is currently channelled primarily through four granting agencies, although support is also available from many other federal and provincial departments and agencies. It is fair to say, however, that architecture is not recognized as a discipline qualifying for funding in its own right. The review processes employed by the granting agencies, which are designed to deal primarily with the science-based disciplines and the humanities, create obstacles that make funding inaccessible to architects. Architects who are eligible to apply for this support (i.e. those in academia) are for the most part neither trained in research nor adequately qualified. The problem goes beyond developing qualified researchers in academia. It has its roots in the heart of the subject of architecture itself, and the research needed in the field of architecture.

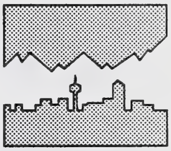
The song we are all learning so well goes, "To get your grant, you must show matching support from industry." That is not the answer to funding research in architecture, as it may be in other areas. The architectural profession certainly cannot pay. It barely makes a living in this country. The building industry, perhaps, could pay, but it is not inclined to see problems in architectural terms. It is more inclined to support specifically targeted projects which are essentially multi-disciplinary, highly technical, and responsive to scientific investigation. The manufacturing sector in Canada has a very poor track record in funding research; multi-national ownerships lead to research and development in other countries. The picture looks bleak, but we believe it is accurate.

The fourth and final point is that Canadian schools of architecture, all of which are under pressure to implement post-professional graduate programs and to initiate research programs, must develop a collective strategy to respond to that pressure creatively. The strategy should outline the case for advanced study and research in architecture, appropriate structures, and levels of required funding. That case has never been made properly, but it is necessary to obtain the support of university administrators. The strategy should also outline ways of finding a national consensus with the architectural profession on these issues. A campaign should be mounted to lobby for the funding that will be needed, both from governments and granting agencies. At the present time, the Royal Architectural Institute of Canada appears to be the best vehicle for this.

A substantial effort will be required of a small group of people. The number of research-oriented academic staff in Canadian architectural programs is very small, while the institutions we are trying to influence are large. We will only succeed if we take an expanded view of architectural research.

To support the schools in this endeavour, work needs to be done to define the scope and content of architecture. This is the "map" to which Prof. Taylor alluded. This, in turn, needs to be cross-related to a typology of architectural research, perhaps one based on the models that we provided. The development of architectural research should be tied to development of what we have referred to in our report as "full career education." Framing the development of architectural research in that context is another means of securing adequate funding. The objective should be to develop a clear picture of architectural research and advanced education as related concerns.

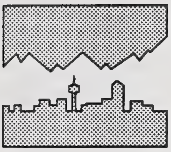
The accreditation process for university programs in architecture, which is about to come into effect in Canada, provides for a recurring review of educational needs. This may provide a forum for discussion of the objectives of advanced education. If called for, biannual review discussions will take place under the Free Trade Agreement between Canada and the United States. This will open up further opportunities for involvement of the professional associations in both countries. Not only will we be able to discuss the problems of advanced studies and research in Canada, the structure of the educational and research environment in North America as a whole will be open to debate.



If a national consensus can be obtained, it is possible that the schools could support each other's efforts to proceed, and even priorize the sequence of development of new programs of advanced studies and research. Far better communication and much closer cooperation will be required of the schools if this is to happen.

Dr. Carrothers: The session that preceded this one addressed connections between research and practice. Our report focuses on connections between research and education. There is a deeper objective that I sense is shared by those who have spoken earlier, the integration of practice, education and research.

Whatever else we do, such integration has to have a high priority. We have to move quickly to a truly functional collaboration between the profession, through provincial associations and other organizations of practitioners, and the educators. This can only be achieved through unprecedented inter-school collaboration. We have to persuade society in general, and funding bodies in particular, to establish some strategically located post-graduate programs. If that is not done, then we face a rather dismal prospect for the development of the discipline of architecture in the directions proposed at this symposium.



The second, equally important, priority is to use this collaboration to develop a more effective mechanism for discourse and dissemination of knowledge, whether arising out of research in academia or research in practice, or, if the ideal situation were to develop, a truly integrated relationship of research, education and practice.

Discussion

Mr. Bazley: Research could provide a wonderful vehicle for linking academics and practitioners. I would like clarification of your second point. Did I understand you to say that research must be related to advanced studies and therefore must take place in universities? Are you excluding the private practitioner who is capable of, and interested in, doing research?

Dr. Carrothers: No. Anyone who is capable of contributing to knowledge should be welcome to participate in research. All I meant to say was that the development of the discipline of architecture will require post-graduate programs strategically located through the country.

Dr. Rolfsen: It is very difficult to learn to do research outside an academic environment. The entrepreneurial climate, in which I work, makes it very difficult for me to teach young people how to do research. Research by inexperienced people is inherently inefficient and expensive. University-based research provides a framework in which people can take more time.

Dr. Carrothers: If educational opportunities are limited to professional programs, then universities may not be the best place for learning about research. If educational opportunities provide for interaction among the various parties concerned with architecture, then the opportunity to develop the capacity to do research can be encouraged in a more sophisticated way. Research skills cannot be taught by lecturing, they are acquired by participation in research activities.

Mr. de Miguel: Could you elaborate on implications for accreditation, and whether consideration has been given to post-graduate studies in lieu of the usual apprenticeship?

Dr. Rolfsen: That is a licensing issue, not an accreditation issue. The provincial licensing associations, in establishing the criteria for the internship period, will accept post-graduate education in lieu of practical experience, within limits.

Mr. Mertins: You seem to be making a case for a national system of post-graduate programs. Have you developed a detailed strategy to accomplish this? Are you proposing that all the schools be required to have graduate programs? To what degree is any of this specific?

Dr. Carrothers: There is little pressure from society for post-graduate programs in architecture. The pressure comes from the particular, peculiar culture of universities in which certain kinds of activities are rewarded and others are not. There is pressure for a particular kind of academic performance that may or may not have anything to do with our concerns regarding architectural research. It certainly has to do with research as defined by as scholars from the humanities, the social sciences and the sciences. The schools of architecture need to collaborate with the professional because society is exerting pressure to reduce funding of *existing* programs. The case for new programs will have to be made on the basis of the intrinsic value of the knowledge and the development of the discipline of architecture. If we cannot make that case, then our prospects for the future are not bright.

Mr Bobrow: In this paper, I see a reemergence of leadership in architectural research at the academic level and I welcome it. It has long been missing. For about 25 years, universities have been telling us that our work has been more advanced than theirs. This has bothered me because it should be the other way around.

Prof. Clipson: Having been exposed to these issues in the United States, Britain, Australia, Sweden, and Germany, I would caution you about seeing the solution as the establishment of a relationship limited to schools of architecture and the profession. Robert Gutman, an American scholar, has pointed out to the AIA and other bodies in the United States that the real consumers of research are not architects but clients, communities, and users. For the last decade, I have directed an institution that conducts US$1.2 million worth of research a year. There are, perhaps, five or six organizations like it in the United States. Almost none of that support comes from the architectural profession. A decreasing amount of it comes from the federal government. We have to find more and more funding from other sources - communities, vested interest groups, special population groups and so on. The situation is the same in Australia and in Britain. The only country that has, in my view, a pristine and stable set of relationships among schools, research organizations, the profession, and government is Sweden.

Architectural researchers often have to obtain resources to pursue their primary research interests by undertaking work that is only partly relevant to these interests. We have to be ethical - we must not accept work of which we are incapable or in which we are uninterested. Therefore, the relationships involved in developing architectural research must extend beyond the government, the schools, and the architectural profession.

Notes

1. Shadbolt, D., G. Carrothers, and I. Harding, *Advanced Studies and Research in Architecture: A Canadian Perspective.* 1990, Canada Council.

A PROPOSAL FOR THE DEVELOPMENT OF ARCHITECTURAL RESEARCH IN CANADA

Michel Lincourt

Mr. Lincourt: I would like to make four points: 1) architectural research is urgently needed, 2) funding is required to support this research, 3) an organization is needed to coordinate efforts to obtain this funding, and, 4) a vehicle already exists to carry out this work.

Why is it necessary to do research in architecture? The need for a better environment is both social and economic. The built environment is by far our largest collective investment, and we have a duty to protect it and to improve it. Every year, the building industry sees an expenditure of more than $55 billion. It is the largest business in this country, and also a business in which we do practically no research. The third need is related to architects. Architects have a problem.

My personal view of the problem takes a historical perspective. Some 1,000 years ago, builders constructed buildings, and many of those buildings collapsed. They devised a system to simulate the buildings before they built them. They started to do drawings and calculations. In so doing, they created the art and science of architecture, and were the only artisans having this science. That created an aura around the discipline. Architects maintained their position because they had this secret science until the end of the industrial revolution. At the end of the 19th century, technology evolved very fast and became more complex. Some of the builders developed specialities. Some became structural engineers. Some became electrical engineers. Some became mechanical engineers. Other groups emerged - developers, bankers and inspectors. After World War I, social scientists became urbanists. It seems that architects lost everything quantifiable in their trade. They were left with the non-quantifiable aspect of building. As a consequence, architects are no longer taken seriously by their clients.

The problem with this is that the "quantifiable" builders cannot do a very good job in building good buildings because they lack the sensitivity, skill and design creativity of the architect. Architects must regain their command of science in order to complement their skills in design. Of course, one must keep in mind that all this is very complicated. Team work is necessary.

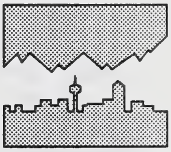
There are also very practical needs; we need to do research in order to permit architects to do their work more effectively. We need to do research to enlarge the body of knowledge; to better serve our clients, to better face the changing needs of the world, to be competitive in the Free Trade system, to provide architects with instruments, tools and methodologies.

We cannot do research without funding. We need money and we need a fair amount. What is big money for our discipline - about $15 - 20 million a year. This is a very small sum for other disciplines. It is possible to get money. My office is an example. Between 1984 and 1989, we generated $1.4 million in research grants from the federal government alone. Our research activity was $2.2 million, the difference being personal investments and retained profits. With these funds, we undertook a series of projects related to the development of methodologies to tackle problems of renovating and managing existing buildings. There was also a project related to air-rights development. If a small office like ours can generate that amount of money, you can imagine the amount of money we could generate if we collaborated.

My third point is that we need an organization to bring together those of us with an interest in research. I have been involved in creating organizations that have affected the development of the built environment. In 1968, I was involved in the creation of the Ministry of State for Urban Affairs. It generated a series of actions throughout the country in order to improve urban environments. One of the initiatives of this Ministry was the Urbex program. Urban experiments were employed to develop urban policies.

One such experiment was the restoration of the Halifax waterfront. Public Works Canada wanted to build a tower about 20 miles outside of Halifax. Several of us at the Ministry of Urban Affairs did a study which demonstrated that it would be better to provide the office space on the waterfront, using this investment to start a process of renewal. Thus, the creation of an institution can have an impact on reality.

I propose that we create such an organization. In fact, it has already been created. In doing research in my office, we soon realized that it is not possible for a single office, or for a few offices across the country, to do research because there is a problem of continuity and there is a problem of profit. The problem is so great that we have to create organizations to provide for cooperative efforts involving universities, private practices, and other organizations.



Claude Parisel, a professor of architecture at the University of Montreal, and I decided to create an architectural research institute. The first thing we decided was the schools had to be involved. The very first person we spoke with was André Masson, then the new Dean of the Faculté de l'Amenagement at the University of Montréal. Next we spoke with the Order of Architects of Quebec, with the Association of Architects in Private Practice, and with the other Quebec schools of architecture - McGill and Laval. This was 1985. We had countless meetings and conferences. We wrote countless papers and letters to everyone in the federal and provincial governments promoting architectural research.

We now have The Architectural Research Institute of Canada-l'Institut de Recherche en Architecture du Canada. It is a non-profit corporation with a federal charter. I chair the board. Mr. Bobrow is very active, and played a major role in creating this organization. We have received small, but very important, grants from the federal and Quebec governments. With that money, we are presently conducting a feasibility study to develop the economic arguments for architectural research.

We are offering to you all - schools of architectures, architects around the country, organizations - this institution. Come and join us. Let us be creative in establishing the "modus operandi" of this organization. It could have a revolving chair, it could be located anywhere or everywhere. Let us not compete, let us join our forces. We now have a vehicle, we do not need to invent another. This vehicle is not in competition with the schools or the RAIC. It is not in competition with anyone. It is only a vehicle to permit us to join forces in architectural research.

In that context, the second point of my proposal to you is the creation of a working group that will have two tasks. The first one is to prepare a work program for the next five years. In that context, if we received $20 million a year for the next five years, what should we do with it? What are our priorities? How do we spend the money? Who is going to do the work? What work will be done? Obviously this working group will not decide anything but would prepare the terrain, a blueprint for discussion.

Let us organize a second symposium - maybe in the Maritimes in October, because I believe in symbolism and in balance. It is important that the funding agencies attend the second symposium. It is important that the rest of the construction industry attend as well - general contractors and all of the specialized agencies.

Those of us who are better at lobbying should accelerate our efforts with the funding agencies. The Natural Sciences and Engineering Research Council of Canada gives out $300 million in grants annually. We should approach them and say we want $20 million of this money for architectural research. It is a small amount. But that amount of money should come to the architects and the people who work with architects in order do research.

Is there a string attached to the use of the Architectural Research Institute? Yes, there is one, and only one. It is this: it is extremely important that decisions regarding research priorities come from the community, from the meeting of the minds. We should not decide the priorities in isolation, whether it is in our own little private practice or our own little brick factory or our own little school of architecture. Let us get together to define the real priorities and the real problems.

PANEL: ARCHITECTURAL RESEARCH - PRIORITIES FOR THE 1990'S

Philip Bobrow, John Archer, and Detlef Mertins

Mr. Bobrow: I will begin with a discussion of my firm's experience in architectural practice and research because it is the basis for my suggestions regarding research priorities. It is almost three decades since we became involved in research. We went so far as to create a research and management company to complement our architectural practice. Our goal was to develop the capability to provide the architectural services that met our objectives for excellence in design and practice. We also wished to make a contribution to the profession.

We became involved in research because of conditions existing in Canada in the early '60's:

- There was a tremendous waste of architectural effort because projects were frequently aborted due to problems in project delivery. Vast amounts of professional time were being wasted because there were problems with design development, because there was no program in place, or because other approvals were not forthcoming. Frequently, these problems led to the cancellation of projects.

- The quality of buildings was generally unsatisfactory. The profession had a poor reputation for cost over-runs, and for making buildings that were not sensitive to the needs of users.

- The work of other disciplines doing research related to architecture was framed in such a way that it was not usable by architects.

- There were extremely limited opportunities for the investigation of innovations such as building systems. We became involved in Operation Breakthrough, the American initiative in building systems, because such opportunities were not available in Canada.

Generally, we lacked a rational base for work.

There were many problems with the three phase, design, documentation and construction model of practice, which was what most of us were following. We felt this process was inadequate for designing new towns, for developing industrialized building systems, and for undertaking multi-disciplinary work.

As a result, the initial emphasis in our research was the development of methods for determining user needs. This involved the development of research methods and programming techniques. We wished to ensure that the architect's work had a rational base, even if that base was subjective. The process should accept subjective material if it is provided by skilled and experienced persons.

There was a need for management structures suited to the collaboration of multiple disciplines on large and complex projects, such as the development of Nun's Island in Montreal. The research on design management led to the comprehensive structured process that we now refer to as the "Facility Acquisition Process." This process consists of a project delivery system similar to that presented in the Shadbolt and Carrothers report [1]. We also developed a project management system, including a performance component. The last is emphasized in our research, from both design and management perspectives.

Our system allows us to account for every dollar spent in our office in a way that provides for the effective management of design. The performance concept has elevated the quality of the work that we do. Architectural programming was a product of that process, and I am proud to say that almost all our projects today use some form of pre-design analysis, which was uncommon in the 1960's.

The explicit project delivery model provided a very useful structure for organizing our work. One of the problems that we encountered early in complex projects such as Operation Breakthrough was that, without such a frame of reference, we could not communicate effectively with other professionals. If the contributions of disciplines ranging from engineering to psychology are not organized according to the appropriate stage of the project delivery process, the issues become muddied. While artistic and cultural issues related to design are important, I believed it was necessary to focus on content to find a rational way to ensure that what was being designed and built was appropriate in other dimensions.

These early efforts led us to the study of the effects of buildings on human performance. For example, with the assistance of the RAIC, we became involved in research on the effects of the physical environment on anxiety and post-operative recovery. The aim was to determine whether design could improve such things as patient recovery. We examined the University of Alberta hospital, with help and funding from Albertans and the Government of Alberta. These studies are complex. We set out to trace the effects of a variety of variables including lighting, decor, amenities, psychological environment, and the state of anxiety of a patient entering a health-care facility. The profession has to find ways to account for such factors so that improvements can be made. We had to use a newly developed statistical technique involving time-related measurements, and relied on the guidance of experts in the use of this technique. Our experience showed that it is essential that university researchers and practitioners collaborate in applying advanced methods to practical problems. We are not alone in these investigations; people in Australia are making excellent progress in relating building design and human performance. We discovered that physical features do improve recovery. The implications of this finding are significant. The patient's situation is improved because fewer prescription drugs are used and the return to a normal environment is hastened. A 12.5 percent reduction in the length of stay is worth millions of dollars in a single institution each year. This type of research is at the frontiers of knowledge and methodological capabilities. Architects had not previously performed such work or developed the required methodologies. What do you do when you are confronted with a problem that is "impossible?" You give it to graduate students. They can solve all sorts of "impossible" problems. You just do not tell them that the problem is impossible. Together with a number of graduate students in psychology and other disciplines, we were able to formulate methodologies for dealing with this kind of problem.

These experiences have shaped my views regarding strategic choices to promote architectural research in Canada. I suggest that a nationally directed program be developed, involving a partnership, including the RAIC, the provincial architectural associations, the schools of architecture, new research institutes, and individual practitioners, to bring our industry into the 21st Century. This partnership needs to be created because our resources are too limited to allow duplication. A formal partnership would contribute to efficient allocation of research funds. The participation of the schools is essential to ensure that the intellectual base for this work is appropriate and rigourous. The priorities for architectural research would rise out of a systematically formulated view that would respond to the needs of the profession and ensure that there would be benefits to Canadian society from improved quality in terms of appearance, content, and costs. If we cannot prove we can achieve that, we will not be able to secure funding. We should take a position in the debate on sustainable development. We should assess, and be concerned with, the effects of our buildings on the environment. We should determine what contribution, positive or negative, architects are making to the environment. We must offset developmental and environmental materialism, which is a problem in our cities, as a result of excessive commercialism and multi-nationalism. Architects should respond to the changing nature of Canadian culture.

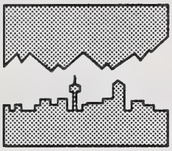
The following are specific topics I personally believe merit attention:

1. Long-term studies of the role of the built environment in health care, housing, industrial and commercial work environments, and urban areas, because of the great financial and qualitative returns possible

2. Ways of developing research skills and methods as a regular part of professional education

3. Research methodologies, to

enable us to address the holistic questions that need to be asked about qualitative aspects of architecture



4. The connections between environment and human performance, which is of concern in fields ranging from health to space travel

5. Methods for experimental research and instrumentation for experimental research

6. The programming-design interface

   This is an area I consider to be of the highest possible priority because of a lack of connection between user requirements identified in programming and design decisions.

7. Representation and simulation capabilities for both static and dynamic modelling of buildings

8. Expert systems for the huge number of small practices that we have across Canada

   These small practices will not be able to function without this kind of support.

9. Holistic methods of analysis for what many of us consider to be the real architectural problem: assessing vast sets of criteria when dealing with a single building

   We do not have appropriate procedures for this. Our firm has proposed some models but we have not had the time to test them.

10. Architectural responses to cultural diversity

11. Research into the design process

12. Research on aesthetics

13. Research on information systems to support design

I will use the health care sector to demonstrate the potential economic value of architectural research. In 1985, Canadians spent $40 billion on health care, more than 8.5% of our gross national product. The operation of hospitals accounted for $16 billion of health care expenditures. The health care expenditure was $1,600 per capita *per day*, and hospital operating costs were $630 per capita per day. The average cost of a bed was $430 per day, and the average length of stay was 13 days. A 1 percent reduction in hospital operating costs would have saved $160 million in one year. A 10 percent reduction in the average length of stay in a 1000-bed hospital would have saved about $16 million in one year. The per capita expenditure in architectural research for hospital facilities was so low, I could not even quantify it; it was less than a cent per person. That is a disaster. What industry can operate with that sort of approach? This is why Mr. Lincourt and I feel the need to write a report on the economic arguments in support of design research. There is a similar case for design research in other sectors.

Mr. Archer: I will address the question of priorities for architectural research from the perspective of my position with the Canadian Construction Research Board (CCRB), which is an advisory board of the National Research Council. The mission of the CCRB is to identify construction research priorities in Canada, with the goal of developing the research capacity of the industry. There are many difficulties with research in construction. Prof. Clipson discussed the low participation rates in research and the low levels of investment. We have also concluded that the construction industry lacks a research culture, at least at the level of the practitioner. The situation in architecture is the same.

Many reasons have been advanced to explain the lack of research in the construction industry: it lacks vertical and horizontal integration, it is fragmented regionally, building codes inhibit innovation, the market emphasizes price rather than quality, the universities are not training construction professionals.

I often pose this question to my construction industry audience, "Is the lack of research really a problem?" The construction industry in Canada has had several decades of good times. My answer to that question is that times are changing. We in Canada cannot isolate ourselves from international markets. If others can build better buildings, perhaps at a better price, consumers will patronize those businesses. I believe that this is already beginning to happen. I say this because I want to alarm people in the construction industry. I think they need to consider the future. From the discussions at this meeting, I perceive that perhaps architects are less confident regarding their future. They feel, for example, that they are not doing as well as the large developers.

Most Canadian construction research is carried out by a few groups. The CCRB is a unique body, in that it is a private sector group of people directing public sector research programs, those of the Institute for Research in Construction (IRC). IRC carries out, in dollar terms, about 20% of the construction research in Canada. The bulk of the rest is probably done by the building product manufacturers, or used to be. Two of the important research centres in that area, Fibre Glass and Domtar, have recently moved most of their operations to the United States. The universities do some construction research, and they are important, but their effort is fragmented and lacks real clientele.

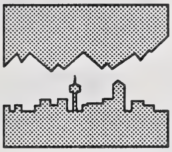
Examination of changes in IRC's research program reveals the influence of CCRB:

1. Geotechnical research is in decline

   This was once the largest construction research effort of the National Research Council. It is declining because the universities themselves have an expanded capacity to do this kind of research.

2. A new thrust has emerged in structural research

   Structural research can be divided into two areas. The first is traditional structural research: seismic effects, tornado and hurricane impacts. This continues to be important because the marketplace does not protect public safety very well in these areas. The second area is the safety and serviceability of buildings. This is a relatively new issue and research has expanded in this area. Canada's infrastructure, including buildings, is aging and deteriorating. There are well-founded concerns about long-term effects on health and safety.



3. Funding of fire safety and materials evaluation will remain level, in absolute dollars, for the next five years

4. Building code research will decline unless outside resources are found

   The costs of maintaining the codes from the public purse have become too great. I suspect that, unless additional resources are found, the codes will move even more quickly toward performance requirements, placing the onus on others to do the research to prove compliance.

5. Building performance research is increasing

   The two primary concerns in this area are the building envelope and the indoor environment.

6. There will be some modest expansion in work on high performance construction materials

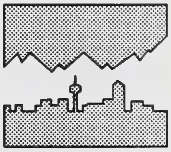
   Work in this area is primarily oriented toward keeping abreast of international advances.

About 20 percent of the work that is done at IRC is funded by industry. For the most part it is confidential. Typically, it involves problem-solving, developing evidence for litigation, and proving technologies in support of bidding. Generally, IRC could be much more active in client-funded research, but this has not been allowed. The federal government has decided that the National Research Council, of which IRC is a part, is allowed to spend a fixed number of dollars. For every industry dollar that comes to IRC, one dollar is removed from the public contribution. Those public research dollars are very important. They support fundamental research that is necessary as a basis for applied research, the kind of research which architects need.

How are the research priorities at IRC established? What is the role of CCRB? The truth of the matter is that the CCRB is not all that influential. In reality, dollars and self-interest drive the research program. Publicly-funded research, what one might call "fundamental research," comprises about 50 percent of the IRC's budget. The bulk of publicly-funded research is directed at health and safety issues and other public objectives such as energy conservation. Technology transfer is also publicly funded; it accounts for another 15 percent of the budget. Client-funded research, as I mentioned earlier, comprises about 20 percent of the budget. The remaining 15 percent is attributable to administrative overhead. The main task of CCRB is to find a balance between industry's desire to use IRC (because there is no one else in the country who can do it) and the fact that IRC loses resources to do work in other areas if it accepts the client-funded research.

Why is so little architectural research undertaken at the Institute for Research in Construction? On one hand, I dispute this observation. The majority of the work at IRC is directed toward the development of knowledge which can be applied to improve building technology somewhere downstream. On the other hand, I will also agree that the interests of the architectural profession are nowhere to be seen in the process of establishing priorities. The reason is that there is a poor fit between fundamental building science and the needs of the architectural profession. This is consistent with the conclusions in the Shadbolt-Carrothers report [1]. We lack an intermediary vehicle to translate basic research into applied research.

I might also pose this question, "what are the priorities for architectural research?" The CCRB has good contacts with all sectors of the building industry. Architects have been on the board, and architects are on our CCRB provincial chapters. In fact, an architect is the chairman of the Calgary Chapter. Architects are invited to our symposium on research and attend our construction conferences. Nonetheless, we do not have a sense of there being an architectural research agenda. Should we conclude that there are no burning issues? I think not. I would find this surprising and, in fact, the discussion of these last few days indicates that there is a research agenda.

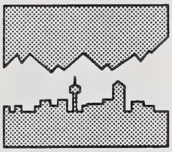


From the perspective of the CCRB, here is what I think the priorities are:

1. The first priority is architectural research which leads to a dramatic improvement in the technical performance of buildings

   The fundamental rational for the existence of the profession is the production of buildings. That is where we are most vulnerable to outside competition. We know that in some countries there is much greater collaboration between practitioners and researchers. Earlier, Sweden was given as an example. We know that some of the private sector construction companies in the Pacific Rim are spending enormous amounts of money on research. For example, the six largest construction companies in Japan individually have research budgets and staff complements which exceed those of IRC. Further, they do not have to serve the whole construction industry. They develop technologies that will give the individual companies a competitive edge in the marketplace.

I am not saying that architects should necessarily become building scientists and be doing building science research, although I am sure some of them would be perfectly capable of doing that. Architects have to set the research agenda. They have to act as the client's surrogate. They have to demand an appropriate level of quality from the people that provide the materials and equipment that goes into buildings.



2. The typical architectural practice must dramatically increase its productivity and effectiveness

Last night, Professor Clipson described the structure of the American architectural industry and the fact that one percent of the firms are attracting most of the work. These very large firms have the resources to be very effective and productive. With Free Trade and reciprocity, Canadian practices are at risk. These large firms can guarantee price and quality.

3. The profession will increasingly have to deal with environmental concerns

I believe that we are entering a period when clients will be more and more sensitive to negative environmental impacts of building projects and more concerned about the quality of the interior environment . Architects are in a very good position to take on primary responsibility for these issues. If this does not happen within the marketplace, the government will increasingly regulate these aspects of building.

Finally, I want to pose the question, "If these are my priorities, who do I think has the responsibility to act?" That is one of the problems I see in symposia. It is good to talk about these things, but it is important to formulate a plan of action. With regard to this first priority about the technology and the technical performance of buildings, the schools have some responsibility to inculcate in students the professional responsibility to represent the interests of clients and users. However, I think the prime responsibility lies with the profession itself. The profession has to develop a strategy for research.

With regard to professional practice, this is clearly the responsibility of the professional associations. Other professional associations are addressing these issues. They support their members by organizing seminars, workshops, courses, and professional retraining. The architectural associations should be heavily involved in this.

The primary issue for the profession over the long-term is resources. The Shadbolt-Carrothers paper points out that real increases in government funding for architectural education seem unlikely given current priorities. I agree with Mr. Lincourt and Mr. Bobrow that funding could be obtained if political action is taken to attract funds to architectural research. Architects are going to have to be much more politically astute and pro-active than they have been in the past. I believe that the professional associations should have a much stronger role in this activity than they have in the past.

Mr. Mertins: To begin, let me say something about myself and my own current work, because I believe that our more abstract discussion should be set into the context of our actual lives and motivations. Having been in architectural practice in Toronto for nine years, I am now a doctoral student in the history and theory of architecture at Princeton University. I have withdrawn from practice, for the moment, to do research on architecture within the supportive environment of a university that provides resources and opportunities for concentrated work. Practice, in my experience, provided few such opportunities and it remains an open question for me whether the realm of everyday practice ever could. This is not to diminish practice, but rather to recognize the need for autonomous research and specialist researchers. Being at a distance from the pressures and constraints of practice is important for many kinds of research. In discussions of practice *as* research, I am worried about the tendency to treat the activities of practice *per se* as architectural research. While it is possible to see design as an enquiring and reflective activity [2], we should guard against accepting as research normative modes of practice that do not pursue rigourous inquiry and have no critical content. The distinction should be made between research that is merely instrumental for everyday practice and research that is directed at a critical problem. Only if we are talking about a type of practice that is significantly different from what we generally have today, should we entertain the view that practice itself is research that should be funded as research.

My current work involves tracing the genealogy of certain notions about the capacity of architecture to be expressive. While it is framed as historical research, the issues are contemporary and the focus is on design practices. The students in my programme have between four and twelve years of experience in practice and are considering issues of practice in their research. This link is important in order to develop distinctively architectural approaches to the history and theory of architecture, rather than relying on approaches borrowed from other fields. In the context of today's inter-disciplinary approaches, this re-grounding of our field is necessary in order for architecture to be able to play a more distinctive role in the processes of social and cultural formation.

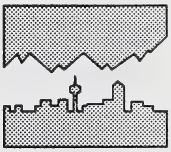
My contribution to this conference will be to draw a line, or rather to point to a line that has become visible in the discussions of these two days. Although we use the same word - research - we are *not* all talking about the same thing; the differences in our positions should be addressed explicitly. The idea that we are all working towards the same objectives is unfortunately misguided. I, for one, do not want to be associated with the positions of my fellow panelists - neither with Mr. Bobrow's desire for more efficient management of architectural production within an "holistically" rationalized society, nor with Mr. Archer's call for the improvement of technical performance. I do not want to be associated with Mr. Lincourt's campaign to raise $15 - 20 million per year for "efficiency" research. I would like, instead, to extend the debate that began yesterday and to continue the chorus against the so-called "scientific" paradigm put forward by these people. While I agree with Dr. Stein and others that the technical sphere has a certain legitimacy in the overall framework of society, in the context of this symposium I feel compelled to argue against it and in favour of the so-called "cultural" sphere for two reasons: firstly, there has been a massive imbalance in funding for research between these two spheres for a very long time, and secondly, this imbalance reflects the continued and oppressive domination of architecture by the technical and managerial world view.

Having said that, I would like to make the qualification that the technical and managerial perspective, which I have ascribed to my fellow panelists and may be discerned in the theme statement of this symposium, is indeed a world view, and as such a culture. Like any other culture, it has developed socially and historically and is being transformed socially and historically. There is nothing natural or inevitable about it. What is deceiving about this culture is that it postulates culture as a separate sphere within it, and denies its own cultural nature and historical specificity. It achieves this in architectural terms through organic and mechanical metaphors. Although these have often been opposed to each other, they are more similar than different and have been used interchangeably. They both treat architecture as instrumental and not an end in itself, and locate architects within a natural and inexorable apparatus working toward the fulfillment of pre-set goals. Ideas of "building industry" and "bio-feedback" combine a sense of organic inevitability with the adjustability and serviceability of a mechanism. Typically, the ideal state of this paradigm is one of frictionless and tensionless "harmony" or "balance". A more terrifying vision of society is hard to imagine. The differences in positions at this symposium are, then, ones of competing and incompatible cultures.

I would like to draw attention to the curious eventfulness of this meeting and the sense of urgency that accompanies it. It is called the "*First* Canadian Symposium on Architectural Research," and its organizers have sought to bring together people from a diversity of backgrounds in order to develop an integrative program of action. Why is there this sense of urgency at this particular time? Why has this particular group been chosen? Does this really signal a new beginning? Why must the different spheres within the "discipline" of architecture be united?

The discussions so far suggest that, for some, there is a tremendous sense of professional responsibility coupled with feelings of inadequacy, insecurity, frustration and confusion. The tension between wanting responsibility and being denied it, between taking responsibility and being crushed by it, has become one of the underlying themes of this symposium. It is this tension that prompted yesterday's fruitless definitional and methodological debates, as well as the call for a united front in order to claim a larger piece of the research funding pie. Yet this tension also reveals an inability to address the seemingly diminished role of architecture - relative to the heady days of the post-War period - with anything other than a re-assertion of the instrumentalist world view. The current perception of crisis has something to do with the fact that architecture is no longer seen as the predominant way of representing this world view, which Dr. Stein called the modernist project of the Enlightenment. Following their indulgence in utopian architectural visions during the 60's and 70's, the managerial mandarins assigned architecture more limited tasks within the overall programme of social rationality. Rather than seeing this demotion as a blessing, architects raised in the era of managerial rationality are thrown into crisis. But let us ask why the advocates of management continue to want responsibilities that should be political and not technical? Why do they continue to aspire to the power of controlling and "streamlining" the lives of others when people everywhere are struggling for self-determination? The loss of efficacy that these management advocates are feeling today may be related, not just to lack of research funding, but to the growing credibility crisis of this technocratic managerial world view. It is not insignificant that *all* professions, including the doctors and scientists who are still taken as role-models by some architects, have "suffered" losses of public confidence, or that questions of ethics are once again rising to the top of the agenda.

There was discussion yesterday about design as hypothesis and experimentation. At the same time, there was discussion about design as a cultural activity and a discourse. These are very different positions. Design is neither a hypothesis nor an experiment. It is a contingent proposition. When one designs, one proposes something, and that something is culturally charged. One is not just hypothesizing, one is creating. Architects act as agents in the continuous unfolding of society, which is necessarily temporal, contingent and unstable. When we import the idea of hypothesis and experimentation from science and industry, it suggests that our aim is either absolute knowledge or mass-production, neither of which fit architecture. To be more precise neither fit the post-industrial society that is emerging today and that I would want to encourage. Surely the desire for mass-produced ideas and buildings has been sufficiently inflected outside architecture that it can similarly be deflected within architecture.



The line between the bio-mechanical culture of scientific rationality and the culture of cultural expression is neither new nor limited to architecture. Indeed, some of the discussion at this symposium seems to be occurring in a time warp of some twenty years, which reveals the extent to which some architectural circles have been isolated during these last decades. The example given in the symposium theme statement about the manufacturers in Quebec using structural polyhedra reveals the shifting of paradigms. It is a story of earnest "scientific" researchers trying to solve the housing "problem" through technology and discovering that they are hopelessly out of touch with the society in which they operate. If their polyhedron houses had emerged twenty years ago in the hey-day of geodesic domes, they probably would have gained greater consumer acceptance, at least for a while. As it was, they appeared in the late 80's during widespread suspicion about technological utopias and the resurgence of taste for historical styles of architecture.

Prof. Taylor made some very helpful suggestions this morning regarding the need to develop broader literacy among architects. We need to be conversant with developments in a wide variety of spheres to be able to take part in a larger discourse. That is something that will occur, can occur, and needs to occur, in many different forms. It needs to occur, not only among researchers, but among practitioners as well. At present, society is being reconstituted without us.

I do not feel the sense of urgency that accompanies the rationalizing imperative. I do not feel a part of the integrated "We" that is implied by this gathering. I am not interested in the definitional and methodological conundrums of a disempowered managerial architecture seeking to renew its authority. I do not value the market competitiveness of such a profession, or the pretence of offering a "better" or "more rational" world. The absence of "disciplinary" maturity and "rationalized" unity are, for me, positive signs of architecture's resistance to simplistic and ahistorical schematizations.

To me, the new-found marginality of architecture is one of our greatest assets because it lets us slip outside the homogenizing view of management into a sphere where we can pursue modes of practice that are more culturally, socially and politically engaged, and are more cognizant of architecture as architecture. While the bio-mechanical, managerial paradigm denies or suppresses its political bias, I would prefer to acknowledge the political content of architecture explicitly and to align architectural research with progressive tendencies.

What is lost in the bio-mechanic paradigm is what Dr. Stein referred to yesterday as "individual reflective consciousness." The organic-mechanical metaphor swallows "us", and we have a very difficult time discovering who "we" are. The problem of the social "appearance" and reception of the polyhedral systems reveals the crisis; the bio-mechanical paradigm treats human culture solely as biology and not as socially and historically constituted.

The alternative paradigm of "culture", then, must certainly begin with such acknowledgements. It must be ruthlessly specific to the given moment in time and place. It must inscribe any claims to truth within an on-going social history. Finally, it must erect a theory of practice on the principle of social difference and heterogeneity. Within this, architecture may be seen to be a fiction-making activity through which experience can be more fully lived. I would like to use a term from the art historian Norman Bryson, and call architecture a kind of "constitutive interpretation" [3]. This two-part term combines the symbolic and the instrumental, which are both aspects of architecture. It also combines the idea of producing or constituting the world with the idea of its reception or interpretation. The things we create interpret the world in which we live, and are in turn interpreted by those living with them. This circularity of production and interpretation is apt for architecture as cultural expression, as a measure of who we are, were, or are becoming.

My point, to conclude, is simply that I am dissatisfied with the idea that we should serve management to make the world as "nice" and "water-tight" as possible. I use the words "nice" and "water-tight" to mark the commonplace manifestations of the managerial view: niceness representing what these people call the aesthetic side, and water-tightness the pragmatic and instrumental side. I would like to see the seal of management's categorizations leak. In the '90's we should continue to undo the ideas of "niceness" and "water-tightness", which stop us from thinking about architecture as a living-through of experience rather than a means of levelling it. All facets of architectural research, whether technical or design related, should question the assumptions on which they have been operating, because many of them impede movement towards a more actively pluralistic and self-determining society. We should shift our conception of architecture from a means of social control within the bio-mechanism of society to a mode of consciousness and expression.

Discussion

Mr. Bobrow: Perhaps the best thing we can take from these different views, is to say that we have now heard the depth and breadth of what architectural research might cover. Whether we do investigate paradigms of architectural practice or work on "nuts and bolts," we are, in my view, conducting legitimate research. I think it is useful to discuss these different views. The profession is very complex. It has many different interests and ideas about what should be done, how we should respond, to what limits we should go. I accept the question, "Should we be doing architectural research?" If we do research, what should it be? That is also a valid question. However, to ask those questions, a place has to be provided and somebody has to pay the expenses. It takes resources and it takes leadership to get those things. I would not want what I consider to be an excellent presentation to diminish Prof. Shadbolt's ability to get a graduate program to hire you. It is important that we all understand we have a very wide set of issues to explore. We need not limit them in the process of trying to advance research. It is excellent that we have different views and that we have these dimensions which represent the depth and breadth of our field. If anything, I would like to find the opportunity to debate these questions.

Mr. Bazley: The topic is research priorities for the '90's. Were we to pursue Mr. Mertins' approach, it would be the death of architectural research. The position proposed is elitist. It has nothing to do with the constituency which I serve. I have great difficulty seeing how it would help the hospital users discussed by Mr. Bobrow. I accept your point that it is valid work, but it is not a priority for the '90's, and it should not be a priority for this group. To put it very simply, there are people we cannot house in the north of this province. We cannot get the houses built up there, we cannot build the houses properly, and we cannot maintain them. Mr. Mertins offers nothing for these people. I also submit that he offers nothing to other people who have specific constituencies requiring buildings.

It is wrong to suggest that research can only be pursued at academic institutions. Mr. Mertins had two key words in his presentation which I accept and applaud. They are "rigour" and "critical." However, I have not seen anything to suggest that those two conditions are the sole prerogative of academic institutions. The institutions are a necessary link. They may even provide the lead and a center for much of the work. However, this profession is capable of doing rigourous, critical work. If we have a moral obligation to serve our constituencies, we have to reject Mr. Mertins' proposition.

Prof. Kayari: It is not that one side is right and one is wrong, but that we are looking at different time frames and different priorities. The research that is undertaken in the scientific disciplines is not, of necessity, of immediate practical application. At some point, it may serve as the missing link that will make a new approach viable. I am not saying that Mr. Mertins' thesis is as esoteric as that, but he represents a radically different point of view which I think is growing. There is much support for this, not only in the discipline of architecture, but in philosophy and other areas.

Mr. Mertins: I do not want to diminish the importance or stature of architecture practice, nor is it my intention to argue against providing accommodation, since that is our fundamental task as architects. My questions would be, "What are the conceptual models that we use to provide that housing? What housing is appropriate in the north of Alberta?" Mr. Bazley may very well have a base of understanding that makes the work that he does significant to the lives of those people. I am not suggesting that all contemporary architectural practice is inappropriate to what I call "constitutive interpretation".

But to what degree can we generalize about these things in research or in practice? If we provide a community building or housing in a particular place at a particular time, is it with a generic model in mind or is the design the result of a discourse between the community within which the building will be constructed and the field of architecture? To compound matters, in our increasingly international culture the idea of community or cultural context has become complex, layered, and, at times, amorphous. It is not only a specific user group that one would want to address, but also larger contexts. The work being done on programming in aid of self-determining groups is very important, but must take into account the larger culture in which we are all working and the specificity of the architectural medium. For me, the act of building is an activity through which a society realizes or objectifies itself to itself. That involves a different kind of approach to those of systemic, market-competitive, or formula-driven models of architectural research and practice.

Dr. Stein: Mr. Bazley seems to think that Mr. Mertins favours an approach that will lead to a lack of concern for people who do not have basic housing. That is not in question. Any legitimate theory must begin with the satisfaction of basic needs. We have to avoid an inappropriately founded legitimation of the sort of society that is leading to a dead end. As I said before, look at our built environment as a reflection of our culture. Not only is it unsatisfactory, not only is it not legitimate, but it also fails to do the things that Mr. Bazley wants it to do. We live in an affluent society, yet poor people are unhoused. Every theory would want that as a beginning, but people need more. People want to have a rich existence. Architecture has to deal with the questions that must be raised regarding a rich existence. This involves academic questions and esoteric questions that are of great significance. Again, people want to live a life worth living. We have to house our poor, but we need to do much more than that. We have to think beyond the materialistic, capitalistic, managerial society to these issues.

Prof. Tregebov: Mr. Bazley's comments about housing in northern Alberta apply to every province across the country. There are very serious problems in housing. They are not technical problems; the issues have to do with cultural values. Why is it that immediately after a hurricane or earthquake in certain areas, it is possible to provide tens of thousands of housing units? The resources are made available. There is political will. In Canada, one or two or three per cent of the population lives in shanties without running water, but we seem to lack the political will to solve that problem. I think there are some very substantial reasons. People much more knowledgeable than myself have written about this. There are problems such as racism that we have to deal with. I think investigations into these nontechnical problems may be the best way to obtain substantial results. Such questioning of our cultural base, the allocation of resources, and the treatment of the environment are the critical tasks facing our generation and the next generation.

Improvement of the detached house is more part of a problem than a solution. We take land, our greatest national resource, and we waste it by putting a couple of houses per acre on it. We are starting with a very irrational position. We have to find our way through all these problems.

Mr. Bazley: Prof. Tregebov states that we house ourselves in an irrational way. Unfortunately most Canadians have elected to house themselves that way. If you ask people what they want, they want a detached residence. I called Mr. Mertins' presentation "elitist." It is symptomatic of much of what architects do. They have theories to which the funding bodies cannot respond. I can understand Mr. Bobrow's concerns. He is striving to improve the practice of architecture. I do not accept that the measurement of improvement or reduction in cost is managerial or dehumanizing or any of such thing. Mr. Bobrow's work on hospitals shows ways to get patients out quicker, happier, and healthier. Our society values that. Money is one of the measures. The improvement of the environment is the objective of that type of work. To me, that is the direction for research and the topic is priorities.

Mr. Leman: From my work in international development, I think I understand the practical thrust of Mr. Mertins' arguments. Development programs funded by the Canadian International Development Agency have resulted in Saskatchewan-style farms being created in Tanzania, including the bungalows with appliances, the tractors and other equipment, the barns, and so on. This has been done on a Tanzanian plain to provide the local people with wheat, which is not a traditional food. Having taken part in many gatherings of architects, it worries me much that we fail to address the concepts underlying our work, such as those having to do with culture.

Dr. Passini: There is well-documented value in following Mr. Mertins' suggestion that the community be engaged in a discourse during research. Providing housing for people who cannot afford normal housing is part of increasing the extent and vitality of the community. It has been proven that, if the affected community is involved in a discourse during research, it accrues benefits - vandalism declines, crime is reduced, and so on.

Mr. Lincourt: It is possible to identify five sources from which the Natural Sciences and Engineering Research Council of Canada allocates about $330 million a year to researchers. If two percent of that money were made available to architects, it would amount to $6.6 million. The Social Sciences and Humanities Research Council of Canada allocates $45 million a year to researchers. If two percent of that money were made available to architects, it would amount to about $1 million. If these funds were added to the same percentage from the Canada Council, Canada Mortgage and Housing Corporation, and the National Research Council, we would arrive at $12-15 million. In order to secure this funding, architects need to talk to these bodies in a concerted way. Mr. Archer could be of tremendous help in this. You could organize a meeting with all these people because of your position within the federal system.

Mr. Archer: You will be pleased to know that the Chairman of the Canadian Construction Research Board (CCRB) is proposing a similar initiative to Council. He has commented on the lack of a focus for research for industry at the federal level, and is requesting Council's permission to organize a meeting. In fact, he has met with the minister responsible for the National Research Council, to raise the issue of the state of research and development in the construction industry and to communicate the urgent need to address this. I think there is a good prospect of working together on this. Architecture is a significant part of the construction industry.

Mr. Lincourt: It will be no help to architects if the $20 million is allocated to engineers to do research on bridges.

Mr. Archer: The CCRB would be concerned if the $20 million were directed toward architectural research and there were no funds for engineering research, because engineering research makes an important contribution to the quality of life too. I think the issue is ensuring that the government is aware of the important effect that good architecture has on the quality of life of Canadians and that this is reflected in funding decisions.

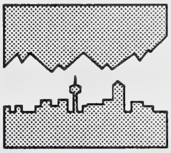
Prof. Clipson last night said something that struck me. He remarked that Michael Graves seemed quite willing to have others follow through after he had created design concepts. When I heard that I said to myself, "Is this a necessary evolution in architecture, or is this a dangerous separation of architectural activities?" I am reminded of this because we are seeing a spectrum of views about the nature of architectural research. My feeling is that they are not in competition. The topic we are addressing is priorities. Priorities are going to change. I have expressed the priorities I see from my perspective, but the project delivery model of the profession's work contained in the Shadbolt-Carrothers' report comprehends the spectrum being discussed. Each part of the spectrum of research informs the other in important ways. It leaves me with two important questions. In this day and age, can one person handle that range effectively? Depending on the answer to that, what is the role of schools in educating architects?

Notes

1. Shadbolt, D., G. Carrothers, and I. Harding, *Advanced Studies and Research in Architecture: A Canadian Perspective*. 1990, Canada Council.

2. Schon, D.A., *The Reflective Practitioner: How Professionals Think in Action*. 1982, New York: Basic Books.

3. Bryson, N., ed. *Calligram: Essays on New Art from France*. 1988, Cambridge Uiversity Press: Cambridge, UK.



PANEL: HOUSING RESEARCH - PRIORITIES FOR THE 1990'S

Fanis Grammenos, Avi Friedman, Linden Holmen

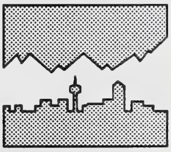
Mr. Grammenos: The Research Division of Canada Mortgage and Housing Corporation (CMHC) accounts for only a part of the research that is carried out by CHMC. The policy sector spends almost as much on policy research. Other kinds of research are conducted by other departments at CMHC. The priorities of the policy-research sector pertain to technical and socio-economic issues. To complement its research activities, CMHC occasionally supports demonstration projects. It is also involved in information exchange activities such as conferences, publications and committees. One of the committees is the National Housing Research Committee, which coordinates housing research efforts nationally. The priorities of CMHC's research division for the '90's are: housing options for the elderly, affordable housing, housing for people with special needs, renovation, urban issues, estimation of housing demand, measurement of housing needs, the indoor environment, sustainable development, responsive programs, and institutional support.

To expand the range of housing choices for the elderly, we are undertaking a number of initiatives. One is called the "Provincial-Territorial Seniors' Conferences." A conference is being held in each province or territory to find ways to implement research findings on housing options for seniors through cooperation with community groups, federal government departments, and other levels of government. Another area of research is home equity conversion mortgages, which eventually will release assets so that the elderly can have a greater choice of lifestyles. A variety of projects have identified ways of helping seniors to live independently as long as possible. For example, "Emergency Response Systems" is an ongoing project to evaluate devices that can be installed in residences to allow seniors to summon help in emergency situations. Another project is "Garden Suites," of which there are examples in Alberta. Resident-funded non-profit housing is another means of allowing elderly people to make choices about the way they invest money in housing and about the form of housing they occupy.

In the area of providing affordable housing, the objective is to increase the supply of, and access to, affordable housing. The means by which CMHC has undertaken to achieve this goal is the recent introduction of the ACT Program, which stands for "Affordability and Choice Today." This program evolved from a study of regulatory reform as a means of allowing a greater variety of housing forms to be built in our communities. CMHC is seeking the cooperation of municipalities, interest groups, and builders in developing experimental projects to assess the validity of the notion that regulatory reform can help industry produce housing that is more affordable. Developmental work on life-cycle costing will allow us to re-evaluate investment in social housing projects in terms of the long-term viability of investment rather than simply considering short-term costs. The results of two other completed projects,"Advancements in Basement Technology" and "Reclaiming the Attic," are being disseminated. These address ways of utilizing every square metre of enclosed space as living space.

The objective of "Housing for Canadians with Special Needs" is to identify the special needs of certain subgroups of the Canadian population, such as the disabled and the environmentally-hypersensitive, and to explore ways of expanding the range of housing options available to them. Initiatives in this area include the publications "Housing Options for the Disabled," "Socio-Economic Profile of Households with Disabled Individuals with a Health or Activity Limitation," and "Cost-Effective Housing Solutions for the Environmentally Hypersensitive."

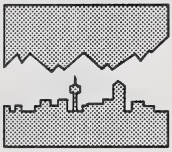
In renovation research, the objective is to support the private renovation market and to improve the effectiveness of existing renovation assistance problems. This is being achieved through an ongoing study in Montreal to identify the determinants of renovation behaviour. This study examines the renovation decisions being made by occupants of all types of housing. In conjunction with the National Housing Research Committee, data on renovation and housing quality was improved. It was felt that CMHC and the renovation industry did not have enough data on the state of housing stock in terms of the degree of renovation needed and the ways in which this would affect investment in renovation. Another area of work is development of effective solutions to moisture problems in existing stock. It has been found that renovated buildings often experience problems with moisture, especially in basements.



In the case of urban issues research, the objective is to understand how housing fits into the broader urban environment. This will ensure that federal objectives regarding the improvement of housing and living conditions can be achieved. In Mr. Lincourt's presentation, the now-disbanded Ministry of State for Urban Affairs was mentioned. There is a renewed understanding that housing should not be studied in isolation from the broader context. Discussion papers were developed on issues such as the recapture of incremental value land, public land assembly, metropolitan change, and urban development. CMHC is supporting several projects on sustainable development.

The objective of research into estimation of housing demand is to determine the future housing requirements of Canadians. This involves: 1) modelling housing demand to the year 2011, 2) an examination of the socio-economic determinants of housing formation and tenure choice, and 3) the development of methods of projecting replacement demand and vacancies. These analyses will make it possible to add a supply component to the model.

Measurement of housing needs has been an on-going concern with CMHC. Every time a policy decision is taken to finance social housing, the obvious question comes up: who are the needy and how many of them are there? We also have to understand the nature of needs by group type and geographic location. Often, there have been discrepancies in the provision of assistance from province to province.



Research on the indoor environment is intended to identify those factors which affect it and to develop technical solutions which will ensure that each house works well as a system. The following sub-projects are underway or being planned. Indoor Air 90, the international conference on indoor air quality, which is being held in July, 1990 in Toronto, is co-sponsored by CMHC. Several papers are being presented by CMHC researchers. CMHC researchers are developing cost-effective ventilation control systems. They are finding solutions to problems such as combustion spillage. The impact of toxic land on the indoor environment of housing is another emerging issue. In Kitchener-Waterloo, some housing was built near or on toxic lands. This problem may surface in other areas of the country.

Research on sustainable development involves the development of methods for building and operating homes as well as planning and managing communities. The research priority is defining "environmentally-friendly" housing solutions and providing advice to consumers and the housing industry on some environmental choices. This requires examination of indirect energy costs - energy included in the process of making, delivering and assembling products for the construction of housing - in addition to the operating energy. In the past, CHMC has sponsored projects on integrated energy systems and methods for reducing water consumption. CHMC also sponsored a discussion paper on the implications of sustainable development for community planning and housing costs.

Many research initiatives are carried out through 1) directed research, which is research contracted out by the research division, and 2) through a scholarship program that supports students who conduct research related to housing. Every year, up to 20 research proposals on housing are funded through the External Research Program. CMHC also supports two university efforts, the Institute of Urban Studies at the University of Winnipeg, and rural small town studies at Mount Alison University. I also consider the CMHC Awards Program to be a research vehicle in that practitioners submit housing solutions which can be used as examples. In addition, there is a Housing Technology Incentives Program (HTIP) for the development of small improvements in the construction of housing. Development costs are funded up to $15,000. To disseminate the results, the Canadian Home Builders' Association (CHBA), in cooperation with CMHC, runs a series of workshops for builders. These also give us a sense of the issues of greatest concern to the building community. This covers the range of issues that we plan to examine in the years ahead, and the approach we intend to use.

Dr. Friedman: Two years ago, the McGill School of Architecture initiated a new Master of Architecture program in Affordable Homes. We were "free" to define its research objectives, and asked ourselves three basic questions:

1. "Who is our audience?"
2. "What should our priorities be?"
3. "How should the findings of the research reach the target audience?"

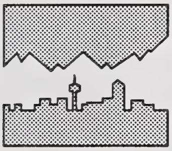
For the first time since World War II, a large number of Canadians cannot afford houses in most urban centres. We had to respond to this situation with pragmatic solutions. According to CMHC, 95 percent of all new houses in Canada are built by the private sector. We therefore realized that if we wanted to have an immediate impact, we would have to work within this framework.

We started by talking to developers, builders, municipal representatives, architects, and granting agencies. At the end we were very discouraged. We realized that housing developers and builders do not believe that architects can make a significant contribution. Municipal planners also believe that design cannot solve the housing crisis. We also had to face the fact that it takes an average of nine years to implement a new concept, technique, system, or a new material into the building industry. This was the situation we had to address.

In setting a research agenda for the 90's, we considered the past two decades to see how the housing field has changed in Canada. The market is very different from that of the 50's and 60's. Today, only 2.9 percent of all families are in the traditional single-income group. Twelve percent of all families are single-parent families, most headed by a woman. This is no longer a marginal group. Life in the home has also changed. Rush hours do not start on the road. They start at home when the family beings its day. By the year 2001, we expect that 3.5 million Canadians will be older than 65. They will have special requirements as well as affordability problems. The time to research these issues is now.

The current affordability situation is even more discouraging. We now build better homes than in earlier decades; they are larger and more energy efficient. In most urban communities, a family income of at least $60,000 is required to buy an average home. However, the majority of Canadian families earn much less than that.

We believe that architects and researchers can make contributions to solving the problem. Architects understand the entire spectrum of designing and building; they can start by studying the processes of regulatory reform. We can re-examine housing standards. Are standards adequate or are we over-building? We can study innovation in materials and construction techniques. Students have to learn to design with vinyl, not just with marble tiles and cedar.



As I mentioned earlier, the market has become very diverse, but most builders still use standard plans. They are not familiar with the special concerns of single-parent families, for example, or empty nesters. Developers and builders think of these groups in terms of "market share", but, in our discussions with them, we found that they need information about the requirements of special groups. For them, research is the monthly CMHC bulletin on housing starts. Architects have to provide the leadership in identifying trade-offs between areas and amenities, for example.

Architectural researchers have to learn to communicate with builders and architectural practitioners in the housing industry. We have decided that these parties must be involved in our teaching and research. Our first project team included a developer and a municipal representative. At the end, the students developed a design on which the builder and the city agreed.

In order to disseminate our findings, we published a newsletter, *Small Talk*, which we mailed to every builder in Canada. The response from the industry was overwhelming. We also developed a publication program. We summed up our research in very simple language, and sent the reports to developers, builders, and architects.

We decided to do something uncommon for architects and researchers: to build a demonstration home on the McGill campus, in the heart of downtown Montreal. We wanted the public to come and comment. We wanted to develop something to study people's needs and desires. There are difficulties in doing this type of research at a university. Academics believe that research has to be complex. We wanted students to know that research can be interesting. Students can communicate with real people and can generate real solutions. We have to break new ground here but I think that this will be a very fruitful approach.

Mr. Holmen: There are two parts to my commentary. The first is identification of housing research priorities for the '90's. The second is my view of the key issue of this conference, which is making architectural research more effective, and increasing the involvement of architects in housing research. My mandate at Alberta Municipal Affairs is the improvement of physical aspects of housing. This is also an appropriate orientation for this audience. I am not going to address policy or policy research, or programs or program research. I am assuming an operational definition of architectural research as focussing on programming, conceptual design and design development. I will list eight or nine priorities for research in housing.

First, I should explain how our priorities are established. My job involves communicating with a number of experts to establish priorities. Here, in my opinion, are the main drivers of housing research priorities:

1. We are experiencing increasing expectations regarding housing. Consumers have higher expec-

tations. We are seeing higher standards - partly because we have standards bodies, and their job description requires them to produce standards. World-wide competition is increasing, driving up requirements.

2. The social and economic context is changing. Dr. Friedman just gave household patterns as an example. We are seeing demographic shifts.

3. There are opportunities as a result of new technical capabilities and inventiveness. Innovation sometimes stems from "technological push" rather than "market pull." While I believe that the "market pull" effect dominates development, I also believe that the new capabilities of technology play a part in determining priorities for research. If, for example, I had discussed expert systems 20 years ago, the audience would have yawned and looked at the ceiling. Now, they are a real prospect.

4. Building failures are a driver of research. I do not mean problems because buildings are put together ineptly. In recent years, new materials, new practices, and new concepts have been introduced. These innovations sometimes cause unexpected performance problems. A classic example was the increase in insulation levels in the early '70's, which gave rise to many problems such as those with moisture.

5. Government policies and programs are a driver of research. They may lead to the same focus as other drivers, but they can also lead to different emphases.

6. There is a natural inclination among members of any sector to increase quality and contain costs in order to increase competitiveness.

Here is my list of housing research priorities for the '90's, which result from the research drivers that I have just discussed:

1. Housing the elderly

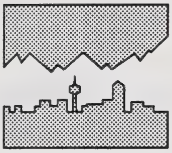
   We have to find the key to the black box process of design development, and use this understanding to create sensitive forms that are responsive to user needs. This can also involve innovative programming and marketing techniques that deal with such complex problems as trade-offs.

2. New synthetic products, particularly, in Alberta, wood products

3. Indoor air quality (IAQ)

   The basis for this priority is clear: efforts to promote energy conservation have led to increased airtightness in the housing stock. The best response to this issue is unclear for at least three reasons:

a) There is disagreement about standards. For example, what should be the limiting concentrations for various substances? It is often difficult to justify standards and compliance tests.



b) The housing stock is highly variable. For example, the airtightness of typical Edmonton homes is substantially different from the airtightness of typical Toronto homes because building practices vary from region to region.

c) There is disagreement about the most appropriate technological strategies. Should we require the use of heat-recovery ventilators (HRV's)? Should we allow the use of naturally aspirating furnaces because of problems involved in controlling both backdrafting and ventilation. There are changing capabilities, such as those provided by ventilation controllers, which provide air change in accordance with need. For instance, some people smoke and others do not, which affects the required rate of controlled air change. This is an example of the opportunities created by new technologies, which I referred to in my comments about "drivers" of research.

4. Building science

The best example of this is our work with a building scientist from Toronto, Joseph Listiburuk, and to help identify how envelopes work. This work highlighted the importance of air movement relative to vapour diffusion in developing moisture control strategies.

5. Technology transfer

This activity is not, on the face of it, research, but I include it for two reasons: 1) it is of fundamental importance to the housing industry because there is so much new information on critical issues and 2) it is a legitimate subject of research. Interactive learning and expert systems are examples of research topics in technology transfer. The Alberta Research Council is devoting considerable effort to this emerging field.

6. Flexible manufacturing

This involves housing production using manufactured components. It is the best of two worlds. It is industrialized housing production, but it is fine-tuned, because of user-friendly CAD-CAM (Computer-Aided Design - Computer-Aided Manufacturing) capabilities. This is not an esoteric or unattainable technology. There are many reasons to develop this technology; they are generally related to improved quality and reduced costs.

7. Appropriate regulations

We live in an environment where, because of new products, the activities of regulatory bodies, consumer expectations and competition, society tends to generate more and higher standards. The degree of regulation can become excessive. I think the housing industry increasingly opposes some regulations. Regulation is becoming a research topic. For example, recent proposals to make fire-suppression sprinklers mandatory in housing led to extensive cost-benefit analysis of these systems. I believe that this field of research will continue to grow.

9. Environmentally sensitive development

Now I will discuss the involvement of architects in research. One example is their involvement in the Innovative Housing Grants Program, which I administer. I would like to give you a few statistics. Over the last nine years we have carried out 190 housing research and development projects. Of those, 19 have been architectural in content, 17 of which were carried out by architects. Thus, architects were responsible for 9 to 10 percent of the projects we funded in the past decade. Of those architectural studies, 10 focussed on design development, 3 were heavily analytical, 5 were evaluative, and 1 was simply a descriptive piece. This is an open door program. People do not have to be selected through a tendering process or invitation for proposals, so this is a good measure of the participation of architects in housing research.

I can think of several opportunities for architects to be involved in housing research. One subject is user studies; when I entered the housing industry in the early '70's, it seemed that more were being conducted. I believe that funding is available to architects interested in housing research. In recent years, CMHC has sponsored extensive technical research, including research into the physical environment. That is also the mandate of the Innovative Housing Grants Program. There are other agencies which can also provide funding, such as the Alberta Research Council and various federal agencies. The Shadbolt-Carrothers report [1] pointed out that architecture is not well-recognized as a disciplinary area of research. While I can see that it must be discouraging to be listed as a sub-group of Archeology and Fine Arts, it is unlikely that many bodies will fund a group because they are architects. Most funding bodies are task-oriented; they will fund architects if architects can address their concerns. I therefore recommend that this group adopt an action-oriented perspective.

I want to address the use of research by architects. In my opinion, there are several ways for architects to use research. A number of public bodies are making significant efforts to promote technology transfer. With respect to housing, I would refer people to CMHC, the Technical Research Committee of the Canadian Home Builders' Association, and the Innovative Housing Grants Program at Alberta Municipal Affairs, which is one of the biggest publishers in housing research and development in the country. With respect to other building types, the Royal Architectural Institute of Canada, the National Building Envelopes Council and the Alberta Building Envelopes Council are extremely active. As I have already mentioned, the Alberta Research Council is doing what may be the country's best work on development of interactive learning centres and expert systems.

I suggest that architects build on their strengths, especially in the area of integrating building systems. Their efforts should address the whole spectrum of research *and development*. This leads back to an issue addressed in an earlier panel: Can design be a form of research? I think it can, especially if the concern with research is broadened to include development.

My first comment about the involvement of architects in research stems from the complexity of the contemporary world and the realities of executing large contracts. These factors will likely require that research and development be carried out through partnerships with other disciplines and interest groups.

Discussion

Mr. King: Can any of the panel members tell me whether Canadian funding bodies are supporting any architectural research on culturally appropriate housing?

Mr. Grammenos: That issue has never come up in the discussion of priorities at CMHC. Should a proposal be submitted for review under the External Research Program, it might be funded.

Mr. Holmen: Alberta Municipal Affairs has not been involved in work in this area.

Dr. Friedman: The McGill School of Architecture did some research on housing for native Canadians. Some of our people, including Patrick Stewart Reid, did some on-site studies of native housing. We found that there is a gap between what is built and what is needed by the users. Research is required to demonstrate more appropriate housing as a basis for government decisions.

After working in housing for the past ten years, I have concluded that, if they wish to influence the housing industry, architects must work with other professionals, entrepreneurs, and government officials. The cultural element is important, but why not influence the market directly rather than doing studies? The only way to influence the market is by bringing all the parties together. In our work, this made it possible to alter bylaws, be sensitive to community needs, and reduce housing costs. We found that the changes in the bylaws did not have to be radical. The key to improved housing is cooperation of all the parties.

Prof. Perks: Are the representatives of the funding bodies saying that their external research programs are sufficiently broad that any area of housing research could conceivably be funded?

Mr. Grammenos: CMHC's External Research Program allows researchers to propose topics. The research that is initiated internally is based on assessments of economic, demographic and socio-cultural trends. From those findings, the research agenda is set for years, although it can be adapted to changing circumstances. Priorities are established through continuing consultation with industry representatives such as the Canadian Home Builders' Association (CHBA). We also have the National Housing Research Council which brings fifty people together three times a year to discuss housing research and research programs.

Mr. Rolfsen: I was very surprised when you mentioned research funding of up to $20,000. I estimate that it costs between $5,000 and $10,000 to develop a proposal and get it accepted. I would like to know who does these $20,000 projects.

Mr. Grammenos: Most are academics with a desire to do research in housing.

Mr. Kehoe: What is driving the research priorities in housing? The lists of priorities that you outlined emphasize technical performance, although an enormous amount of work has been done on this and little on housing form. I feel housing is better constructed than it used to be, but is, for the most part, unsuccessful in human terms. The housing stock is fairly uniform and bland. It seems to me that, if architects were influencing research priorities, housing form would be considered important. I did not see that in the presentations.

Mr. Holmen: When I was discussing housing priorities, I started out with a list of driving forces. I mentioned items such as increasing requirements, social change, and so on. You must realize that no single body is determining these drivers - they are forces in society. No individual told women to work or directs the divorce rate to increase, but that is happening. Housing research priorities result from observation and communication with others in the industry. Asking whether or not architects should drive the research agenda is missing the point of my presentation. I gave a rational basis for housing priorities. Those are not set by individuals. They are a function of individual and societal aspirations.

Mr. Kehoe: The agenda can be more or less responsive to social change, economic change, and so on. At some point, someone is interpreting those changes and saying the priorities should be X,Y or Z. What is the mechanism for identifying those priorities? What kind of consultation goes on, and have architects been involved in that process?

Mr. Holmen: A number of research programs are responsive. In the case of Alberta's Innovative Housing Grants Program, we suggest priorities based on discussions with many individuals and groups, but the door is always open. If someone presented us with a proposal to study culturally appropriate housing, it would be judged on its merits and in relation to other proposals. Mr. Grammenos can indicate the degree to which this happens at CMHC. I think there is a greater emphasis on external consultation in the establishment of priorities at CMHC than was formerly the case. In his presentation on priorities for architectural research, Mr. Mertins called society "management-oriented," and that seems to be a strong force in determining priorities.

Mr. Kehoe: Architects have not been

a part of the process you describe. At the same time, I hear various housing agencies saying that architects are not applying for research funds. There is a connection between the two.

Dr. Baniassad: Mr. Holmen mentioned that 10 percent of housing research funds went to architects. It would be interesting to know to whom or where the other 90 percent go.

Mr. Holmen: We have several ways to categorize it. Businesses secure about 60 percent of the funds, with the remainder going to professionals, non-profit corporations, and institutions. These businesses may be further divided into builders, building product(s) manufacturers, and engineering consultants.

Dr. Baniassad: I am only trying to find out who gets the other 90 percent, social scientists?

Mr. Holmen: Our mandate emphasizes physical aspects of building. Social scientists have received a small amount of funding.

Mr. Grammenos: In the case of CMHC's External Research Program, which is more academically oriented, 90 percent of the funds go to sociologists, economists, geographical-ecologists, and engineers.

Dr. Baniassad: In the case of CMHC, it would be interesting to know the comparative priorities and funding allocations between what you call external research programs and internally directed research programs.

Mr. Grammenos: The difference is that the internal research is directed research. The External Research Program relies on voluntary submissions from the community.

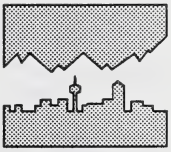
Mr. Bazley: The staff of the Innovative Housing Grants Program is interested in having architects involved in research. However, it is difficult to find architects who are both interested in, and capable of, doing research. For example, it took me three years to find someone to undertake a research project on sub-division design. Architects could take a more active role in influencing priorities, and being involved in research is a way to do this.

Prof. Perks: Are there ways that architects can influence or play a part in research on regulatory reform?

Mr. Grammenos: Through CMHC's "Ability and Choice Today" (ACT) Program, architects could join forces with developers and prepare proposals for innovative housing. For example, CMHC, in conjunction with the Canadian Home Builders' Association, last year demonstrated the "Charley House." This dwelling could be converted between use as one or two dwellings in response to changes within a household. The municipality in which it was built demanded that the dwelling conform to requirements for detached dwellings. Once the house is constructed, the owner has the right to make conversion renovations without additional approvals.

Mr. MacDonald: Ontario has a renovation code that was developed in 1983. It is Part 11 of the Building Code although it has not yet been adopted by the National Committee on the Building Code. This relaxes standards for buildings that are more than five years old in order to encourage renovation rather than demolition. The overall committee for Part 11 was chaired by an architect and several architects served on this committee.

Ontario's top priority, at the moment, is affordability, and architects have a role to play in dealing with this issue. The housing cost increases in Toronto have outstripped every other consumer item. We already have a hundred thousand units of social housing, which are expensive to maintain and cannot satisfy the need. Rather than responding to the affordability problem though government-built housing, the Government of Ontario has taken a novel approach. It has recognized that the vast majority of housing is built privately, and has therefore begun to intervene in the approval of municipal plans. The Ministry of Municipal Affairs and Housing last year put out a "Land Use Planning for Housing" policy statement. Initially, a guideline was established that 25 percent of all new housing should be affordable to 40 percent of the population of a region. Affordability has been defined in terms of a precise formula assuming 30 percent financing and average income as determined yearly by Statistics Canada. Initially, municipalities believed they could ignore this guideline. Ratepayers groups opposed to smaller housing on smaller lots opposed its provisions. However, the Ministry of Housing has been able to ensure that the guideline is implemented through interventions in the approval of plans at hearings of the Ontario Municipal Board. Looking back over the past five years, it is hard to believe the changes in attitudes in Ontario regarding housing. It is an exciting time for architects because they are challenged to come up with good designs in response to tough constraints. They have to find ways to make these blocks of housing attractive, functional, and flexible for the mix of first-time buyers, whether the homes be semi-detached dwellings, row houses, or over-garage apartments in detached housing.



Mr. Pask: My question goes back to some of the basic philosophical issues that Mr. Mertins raised. Is there a real interest in examining housing forms that respond to research? Is there an interest in follow through politically? Are there mechanisms to convince politicians to support innovative suggestions that make sense?

Mr. Holmen: There are mechanisms to approach politicians about implementing innovative solutions. However, I think that "the political route" may not be the most effective approach. For example, within my Research and Development Section, we have many ways of promoting the adoption of useful research findings. We attend many industry meetings to talk about the results of research, at which we display project results. We administer a major publishing program. Furthermore, the determinants of the adoption of research findings are not necessarily political. One example is an innovative, less-expensive servicing technique. In that case, I spoke to a number of developers who said they were busy or found the task too difficult. In that case, it was not even a regulatory problem. If research can provide a better solution in terms of measurable quality and costs, then we will help industry commercialize it. A more successful example is our efforts to commercialize the airtight dry wall approach. We worked hard on this project and managed to change a Canadian standard to allow the use of paint as a vapour barrier. Some government agencies do have the will to work for positive change and are prepared to work with others to implement innovations that make sense.

Notes

1. Shadbolt, D., G. Carrothers, and I. Harding, *Advanced Studies and Research in Architecture: A Canadian Perspective*. 1990, Canada Council.

ARCHITECTS AS RESEARCHERS: THE CASE OF THE DETACHED DWELLING

James McKellar

Is is my view that, historically, the architecture profession has shown little interest in the form of housing that is most popular, the detached dwelling. I helped organize the Third International Shelter Conference that was held in Washington, D.C. two weeks ago, and discussions at the various sessions confirmed a trend in housing that is surprisingly uniform. Many countries want to increase the production of privately-owned detached housing. At the moment, I am working with a state committee in the Soviet Union dealing with the privatization of housing; the Soviets want to shift their production from high-rise apartment blocks to detached dwellings. For the last 25 years, about 85 percent of all housing in the U.S.S.R. has been constructed of large concrete panels. The Soviets now want to shift, within the next 5 years, to 40 percent of housing production being detached housing. Some people may ask, "Why do the Russians want the suburbs that we don't want?"

Architects may be critical of this trend in housing development, but much of the world seems to want the detached dwelling. This is not to imply that others want exactly what we have in North American. However, it must be recognized that the ownership of a house has strong psychological appeal to many people. Unfortunately, there is something about the attitude of architects that prevents us from communicating effectively with the people who provide such detached dwellings, as well as those who eventually occupy them.

There is a gulf between the popular image of the house and that held by architects. I have been living in New England for five years and have become intrigued with the classic and popular "salt-box" house. It is a wonderful house. I also teach in a school of architecture where faculty think that the solution to housing is to build irregularly-shaped custom houses with lots of corners. The last thing they would consider is a box. Their view of housing is divorced from the notion of homestead. It has nothing to do with the psychology of owning and living in a home. Somehow, in educating architects we overlook this fundamental consideration.

Architects are missing great opportunities by not being more extensively involved in housing. Housing is the single largest source of wealth of a country. The total investment in the primary and secondary mortgage market in the United States far exceeds that in the equities market. Construction of new housing is a very significant part of Gross National Product. The amount of money that a country invests in housing, both formally and informally, is formidable. Despite being a profession that has the capability to improve the quality of the housing stock, we have contributed little to this vast sphere of building activity.

My own research interests focus on the role that design can play in mediating between housing markets and the means of production. Adrian Forty wrote, in *Objects of Desire: Design and Society from Wedgewood to IBM* [1]: "The particular task of design is to bring out the conjunction between ideas that will make a product marketable and the available means of production".

To me, that statement best summarizes this issue of design. Industrial designers, in many ways, are much more aware of market forces than architects. We architects do not see ourselves as a bridge between the marketplace and the means of production. Examination of this link can reveal new opportunities for housing research.

I want to highlight three points concerning the involvement of architects in the housing field. First, architects have never proven to be crucial to the production of housing. However, they have made very significant contributions by showing consumers new possibilities. The housing industry is not an industry that is susceptible to the control of any one group and architects, no doubt, get frustrated with working in this highly fragmented environment. This is an industry that involves very little capital investment and a low level of skill. In the United States, we say the typical home-builder is a person with a pick-up truck, a six-pack, and a black labrador with a red bow tie around its neck. Architects have never been at ease with the inherent culture of the housing industry in North America.

There was a period in the United States when Sears and Roebuck produced a lot of housing, very good housing, and without architects. Today, people will take visitors around certain urban areas to show off these houses. Much housing is built by the informal sector and again without architects. Although little is known about the renovation industry, it is estimated that about 48 percent of all residential construction dollars in the United States today are spent on renovation. Architects have not been prominent in this category of work either.

Home-builders have varying skill levels and generally use simple technology. I would say a primary improvement in the use of technology in home-building in the last 25 years has been the introduction of hand-held power tools. The housing industry is diffuse, diverse, and generally "low-tech;" it will be this way for a long time to come. Architects find this difficult to deal with. They have not found success with their "high-tech" building systems.

While architects are not essential to the construction of housing, they can play an influential role in informing people of the choices that can be made. However, they need to develop a deeper appreciation of the needs of the consumer. Consider Charles Moore's comment [2]: "You become an expert by caring and working, not by the receipt of any gift from high."

Housing design is not the prerogative of the architect. Greater choice should be provided in housing because the structure of our society is changing and not because architects want it. Seventy-five percent of all households in the United States today are not traditional families. By that, I mean a household is generally not two parents and children. Household formation has changed dramatically over the years. The average household size in 1948 was about 4.2 persons. Today, it is about 2.7 persons. We have single-parent families, single persons, empty-nesters and the elderly. Development of architectural responses that are sensitive to the needs and desires of consumers would be a major contribution by the architecture profession.

My second point is that consumers of housing are free to exercise their household preferences in the marketplace. The choices they make will have little to do with the preferences of architects. While architecture students cultivate a belief in the virtues of high-density low-rise housing, consumers spend their money on houses such as a little New England salt-box on a small piece of land with a vegetable garden and a front lawn. Good taste, we are told, is a singularly important factor in the design of a house. We are usually told this by people who assume that they possess it, namely architects. I think it is important to recognize that no matter how well one designs a house, there may not be a buyer. Housing is a consumer product, cast within a free market system.

Third, the detached dwelling is a cultural artifact symbolizing values that embody highly personal choices. This is probably the most important aspect of housing. The house is a cultural artifact. The Levitt style bungalow was a very important part of the history of housing in the United States. For 25 years, until architects "rediscovered" the suburb, disparaging comments were made about the type of community that Levitt built. The fact is that these communities have become icons in their own way. People, not architects, create places that are uniquely their own. We have to find ways to instil in our students, and in our profession, the understanding that housing is a cultural artifact. If the people who live in projects like the St. Lawrence complex in Toronto had the choice, they would likely go out and buy their own little house and establish their stake in society.

Any move to change housing production to more effectively utilize architects has to be based on a conceptual framework that recognizes the interrelatedness of the various aspects of housing. We will not be effective if architects deal with design, bankers with mortgaging, and engineers with the design of structural systems. It is important to realize that finance and government policy are, along with design, critical factors in housing production. At the International Shelter Conference, we realized that a prerequisite to changing the means of production in socialist countries was to create a mechanism by which personal savings could be accumulated so that people could express choice. Without a mortgage market, it is very difficult to express choice. The substantial influence of Canada Mortgage and Housing Corporation and its U.S. counterpart is due to their respective roles in housing finance. At the MIT Center for Real Estate Development, when we deal with technological innovation we deal with it within a broad conceptual framework that includes the finance system, demographic changes, and other cultural factors. One has to work within a comprehensive framework in order to do effective housing research. It is necessary to know which changes will have the greatest impact on the household and what factors will affect the way we deliver the products to meet these changes.

If architects are going be effective in housing research, we must develop a broader understanding of the housing industry. Few architects understand how mortgage markets work, how capital is raised, and how capital moves. I would say that housing standards in the United States today are influenced as much by the secondary mortgage market as by many local regulations. The secondary mortgage market pools mortgages, and enforces uniformity of demand. This uniformity is translated into uniformity of supply, of house size, set-backs, and other physical features. Those providing financing want security of investment, and uniformity of product is seen to best provide this security. Our choices are being diminished by realities that are invisible to most architects. Very few architects will say "The problem I have is the secondary mortgage market." We have to better understand why consumer choices are being limited.

To research housing, it is necessary to have an understanding of the kinds of houses that have been built, the changes that have taken place, and the changes that may occur in the future. Let me focus on one aspect of change that is of keen interest to architects, namely, the design of the house. Five elements have enforced the most significant changes in housing design since the 1920's:

1. The accommodation of the automobile

In the 1920's, the garage had not yet found its place. It was usually a "garden house" or out-building. From the 1930's onward it became a spatial and formal component of the house, usually giving the house a "grander" appearance. By the 1930's the garage was integrated into the mass of the house. In the 1950's the garage became a multi-purpose space and by the 1970's had assumed a position of prominence in the composition of the principal facade. While the idea of the "home" has now been fully reconciled with the automobile, the garage is still an awkward element in the composition of the house.

2. The spatial arrangement of rooms and other spaces

Certain themes can be discerned in the internal layout of the house. The two-storey house had two zones. The upstairs was private and informal, while the downstairs was more public. The shift from two to three zones began in the 1930's and three zones, sleeping, living, and recreation, were a feature of 1950's homes. The advent of the bungalow brought horizontal, rather than vertical, separation of public and private zones. Then the attached garage was shifted to create the breezeway. A new element was brought into the house, the recreation area. The master bedroom with bathroom ensuite emerged in the 1970's.

3. Subdivision layout, siting, and landscaping

Changes in site layout tend to reflect cultural attitudes toward "natural landscapes" in general and domestic landscapes in particular. The functional layout of the 1920's and 1930's gave way to the garden as an object of contemplation by the 1970's. In 1948, an influential booklet called *Planning your Neighbourhood* was produced, not by planners or architects, but by the American National Institute of Health. This publication stated the necessity for, and size of, side, front, and rear yards. These guidelines were widely adopted, although they came primarily from the medical profession.

4. Formal versus figural appearance

The American house has always freely used figural devices, independent of their authentic formal roots. Tudor, ranch, Georgian or "modern" features can be liberally applied to almost any form. The new, representing the progressive or the modern, has taken hold in the west, but not in the east where the old or "traditional" is preferred. The traditional, in this case, evokes respectability and continuity with the past.

5. Materials and building components

Changes brought about by new materials and technology have been all but invisible. New materials are still cast within the existing structure of the industry and tend to emulate old practices. Aluminum siding is embossed with a wood grain pattern and plastic laminate is made to look like marble. There has never been strong support in this country for mass production and standardization.

Peter Rowe categorized detached houses into seven basic types [3]:

1. The "Square Plan"

The two-story square or rectangular plan emerged in the 1920's and lasted through the 1940's. In the traditional square plan, the private and public spaces were clearly distinguished by vertical separation. The garage was an awkward element. External appearance portrayed traditional period styles - colonial, regency, federal and tudor.

2. The "Bungalow"

The bungalow had its origins in India. It was brought to North America from both India and Australia, becoming the dominant housing type in the 1920's. It represented simplicity, efficiency, and the lifestyle of the new family. It has been with us ever since. The private and public spaces are located side by side instead of being separated vertically. External appearance often emphasizes strong, formal qualities.

3. The "Basic Ranch"

The most striking feature of the basic ranch is the attached garage, adding a third zone to the bungalow. This introduced a very strong horizontality, which required lots at least 21.5 m (70 ft) wide and which were often 31 m (100 ft) wide in the United States. People discovered that if they detached the garage they could create a breezeway. Then they discovered that if they enclosed the breezeway they could have an extra family room. Before long the garage was a playroom. The house was extended into the yard through the addition of decks. Living spaces began to move outward, and the connection between inside and outside space was strengthened. Decorative and figural expression was kept to a minimum.

4. The "Middle Ranch"

The middle ranch is a more articulated version of the basic ranch and appeared in the 1950's and 1960's. Opportunities to integrate "outdoor" areas arose with the L-shaped and U-shaped plans.

5. The "Rambler"

This is a late development of the ranch with features such as atria, attached garages, non-rectangular lots, and a stronger connection between the house and the lot. Strong horizontal roof planes were complemented by garden walls, pergolas, and landscape elements.

6. The figured compact plan

This plan combined later "ranches" with the figural expression of the earlier "squared plan". This is a very popular model today, to be found in many parts of Calgary and other Canadian cities. Marketing stresses "tradition" and "authenticity".

7. The Avante Garde house

This style first appeared in the 20's and 30's with features such as cathedral ceilings and spaces flowing into each other. The Mark 1, Mark 2, and Mark 3 houses sponsored by CMHC and the Canadian Home Builders Association would fit into this category. However, these are the least favored of all the styles and the most radical in design and layout. An expression of modern technology tended to be a hallmark of the external appearance.

These seven categories are a convenient framework for considering people's preferences in housing and the underlying reasons for these preferences. We should understand why some of these prototypes are still with us and why many of these housing forms are still relevant today. However, we need to re-invent the context. The design of the neighbourhood is probably our greatest challenge. Consider award-winning homes; the house is always shown without reference to the neighbourhood. What then happens when we build 50 of these award winners? Do we create an award-winning neighbourhood?

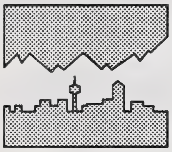
As architects, we can learn much from the housing experiences of this century. For instance, architects are currently researching the expandable house as a way of dealing with affordability. There was a period in this country when several hundred thousand of CMHC's "Model C" or "wartime" house designs were built in a period of a few years following World War II. Mary Galloway, in her thesis, *User Adaptations of Wartime Housing* [4] examined the current state of these houses to see how they were adapted by their occupants over time. One thing she discovered was that people typically build additions when their children leave home. The reason they expanded the house had nothing to do with functionality. After raising large families with only two bedrooms and one bathroom, they would typically add a vestibule and a family room. The renovation had to do with proving to the rest of the family that the elders were still homesteaders. Another finding was the differences in patterns of renovation across the country. In Vancouver, in response to rainy weather, occupants invariably jacked up the house, intact, and added a new first floor. In the Maritimes expansion was horizontal; the addition of a new wing. Approaches exhibited distinct regional differences.

As I said earlier, to do effective research in housing the researcher must acknowledge that the house is a demand-driven product. It is a consumer product. It is something people purchase to meet a household preference and they expect choice. We are all familiar with the builder's house with imposing columns framing the front door. This tells us something about what people expect. The developer will do his or her best to accommodate such preferences. Symbolic presence and identity play an important role in the acceptance of a house design in the marketplace.

Developers do not even worry about being pure in maintaining stylistic consistency between the inside and the outside of the house. They follow the Robert Venturi model. A Victorian exterior can coexist with an American interior. Styles are interchangeable. The front can be Tudor and the rear Queen Anne. Developers view technology as giving them that capability. It may be surprising, but consumers do not see a problem with this. I am not arguing that we should design this way, I am just saying this is the way the marketplace works.

Philip Langdon portrayed the view of the developer in his article in the *Atlantic*[5]: "The housing developer's task is first to innovate and then to disguise the innovation within an atmosphere of pleasant familiarity."

Developers are well aware of what they can get away with. They know that customers desire a certain degree of choice but also cannot afford everything they may want. Developers will also tell you that purchasers react to what they see. I was on the board of a major residential developer in Calgary during the 1970's, and company policy was "be a follower, never a leader". It was left to the small developer to try the new ideas. The big companies then take advantage of those ideas that work.



As one of those small developers, I built some of the first narrow-lot infill housing in Calgary. I tried to build a house that melded into the context. I wanted my houses to feel familiar; designs should appear anonymous. For some reason, architects have a proclivity to create designs that are strikingly different from neighbouring homes. For instance, an architect will typically do something like set cedar siding at 45 degrees to make a house as conspicuous as possible. An architect will emphasize the fireplace flue by placing it prominently on the front facade of the house and painting it black. You can usually pick out the houses that architects design, they tend to take features, particularly elements of technology, and do the very opposite of what a developer would do. Now we have to ask, "Why do we do such things?"

We would rather not admit that Levittown reshaped the housing landscape. The post-war approach to building houses on a large scale is what I call Henry Ford's assembly line in reverse. Levitt discovered this approach to rationalizing the construction of the tract house. The house remains stationary and the workers troop by in a managed sequence. One worker does kitchen cabinets, another installs carpet, and so on. In contrast to this approach, architects would rather address concepts of systems building. Many architects went to Scandinavia and Germany in the 1960's and 1970's to see what was being built. This coincided with the emergence of Operation Breakthrough in the U.S. in the late 1960's to apply manufacturing technology to the production of affordable housing. In its brief existence, this program created a series of prototypes, at great expense, almost all of which were in the medium density range.

Operation Breakthrough produced dwelling units without addressing the question of who would buy them. The project was a heyday for architects, and I was one of them. We designed three systems, brilliant in conception. The techniques of connection and other technological features were superb. Unfortunately, the approach had absolutely nothing to do with the real world. The problem was that this was a supply-side rather than a demand-side approach. It defied the logic of the marketplace.

Architects are taught to optimize the design and manufacture of housing from the supply side, rather than to address household preference as expressed in a market economy. We have been taught to assume standardization of demand. This is evident in drawings in architecture magazines. This view goes back to architectural theory in the 1920's and 30's, particularly in Europe, and the work of Gropius and his interdisciplinary teams. As I know from personal experience at schools of architecture, most of our housing design projects in the 1960's involved re-design of five or six city blocks, which is a supply-side approach. No one ever discussed the organization of the building industry with us. No one ever told us that the building industry was shaped by household preferences.

The typical approach to teaching housing design by university teachers in schools of architecture has been predicated on large-scale development, a scale of development that is inconsistent with the way we build houses. Plans are derived from *a priori* theories, which are assumed to have historic permanence. Architects shun the concept of a house as a cultural artifact influenced by changing social values. This historic flaw in our approach to housing is a major impediment to doing effective research today.

To conclude, if architects are to be effective researchers, I believe that their studies will have to meet the three conditions that apply to any type of research:

1. First, this work must advance knowledge in the field. The typical published work of architects in glossy format, in my opinion, is not research. There is a fundamental difference between practice that gives evidence of the norms or standards of the day, and work that sets new boundaries. Whether one is in the private or the public sector, research has to lead to a new and better understanding of the field.
2. Studies must be subjected to peer evaluation. Research must be scrutinized. Unfortunately, we do not have refereed periodicals comparable to those found in the sciences. We have not found an acceptable counterpart except for the odd competition.
3. The knowledge created through research has to be broadly disseminated. Researchers in both the private and public sectors should have their work judged by these criteria. We must establish our own basis for assuring the relevance and quality of our research work.

Discussion

Dr. Passini: You give a subdivision of two hundred identical detached houses as an example of a successful housing development. This does not provide choice.

Prof. McKellar: While you do not see choice, I believe that the consumer does. If we consider Levittown today, the houses are differentiated by such simple features as the addition of shutters or the colour of the front door. The house plans do not have to be changed to create differences that satisfy the consumer. For example, the salt-box is widely built in New England but owners personalize each home.

Mr. Maas: What about medium density housing such as Beacon Hill in Boston? There is a strong demand for this type of housing.

Prof. McKellar: The “Beacon Hill’s” are not representative of the overall housing market. Wealthy people want to live there and walk to work. That part of the market will take care of itself. Most architects would be more interested in designing one custom infill on Beacon Hill than in finding ways to individualize the 5000 salt-boxes that will be built next year. Let me ask you this question: Why is the housing in Levittown still popular with consumers today?

Mr. Bobrow: I am still not convinced of your arguments regarding demand and supply. If the demand for housing is strong, any design sells.

Prof. McKellar: I can say that of some public housing projects that we subsequently demolished. Anything would have sold. Levitt was able to connect consumer demand and the means of production. He rationalized a system of building that met that demand at that particular time.

Mr. Bobrow: What does that have to do with architecture?

Prof. McKellar: Most of the work that architects do in housing is inconsistent with the means of production. We do not look at design as a bridge between a marketplace and a means of production. We look at it as a way of optimizing the supply side of building. Operation Breakthrough is a great example.

Mr. Bobrow: My own experience is that a vast amount of housing all over the United States, huge projects, have been developed by architect-developer teams. Look at the work of Johnson, Johnson and Roy, for example. They have to be concerned with the demand side. Detached housing in America includes extensive tracts designed by architects. Much of the detached housing that is produced without the involvement of architects is based on designs developed by architects. I think you are underestimating the contribution of American architects to that kind of housing.

Prof. McKellar: I not arguing with that point. I would not want to underestimate the role of people like Rodney Friedman in San Francisco or Barry Berkus in Santa Barbara. These are people who have spent substantial portions of their careers working with developers. I believe that, like these two individuals, we have to make our services more relevant to the housing industry.

Mr. Leman : I am troubled by your presentation. Your slide showing the factors affecting the housing process does not include the environment as a factor. I am troubled not only by your reporting what the market does, which is important for us to understand, but by your enthusiasm for detached dwelling. Every 12 or 13 years, another billion people are added to the population. In providing housing, we are dealing with land, which is a scarce resource. We know what urban sprawl has done to North America. The detached dwelling depends on the automobile. Total reliance on the detached dwelling and the automobile worries me. How do you see the future of the detached dwelling, considering our perceptions of the realities of the near future.

Prof. McKellar: First of all, I was not asked to address the problems of the world. I was asked to talk about research on detached dwellings. The fact that I spoke to the topic does not mean I am indifferent to those other things. As I said earlier, I organized the Third International Shelter Conference at which we did address those issues. The difficulty is that from Zimbabwe to Russia to China, everyone now wants to build detached housing. We are struggling with the very issues that are troubling you. Those issues are troubling a lot of people. The Russians want to switch 40 percent of their production of housing units to detached dwellings in the next few years. We can tell them they are wrong, but they are not going to listen. In Zimbabwe, they believe strongly in self-sufficiency. They believe that every person should be given what I consider to be an extraordinary amount of land. This sounds wonderful, but they will soon run out of land. However, I am not the one to tell these countries that they are wrong. You, and others, may choose to find in your research ways to better inform people of the problems. Conference attendees from other countries were surprised to hear from Americans that their housing system is not the solution, that it is not delivering affordable housing.

Notes

1. Forty, A., *Objects of Desire: Design and Society from Wedgewood to IBM.* 1986, New York: Pantheon.

2. Moore, C., G. Allen, and D. Lyndon, *The Place of Houses.* 1974, New York: Holt, Rinehart, and Winston.

3. Rowe, P., *The Shape and Appearance of the Modern American Single Family House.* 1987, MIT-Harvard Joint Center for Housing Studies, Cambridge, MA.

4. Galloway, M., *User Adaptations of Wartime Housing.* 1978, University of Calgary.

5. Langdon, P., *The American House: What We're Building and Buying,* in *The Atlantic.* September, 1984.

FORUM:
RESEARCHING THE DETACHED DWELLING - WHAT CAN ARCHITECTS CONTRIBUTE?

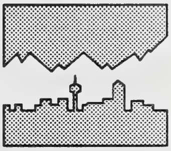
Jocelyn Duff, Avi Friedman, Thomas MacDonald, and James McKellar

Mr. Duff: With the abolition of the Quebec Ministry of Housing, the Quebec Housing Corporation assumed all governmental responsibilities in matters relating to housing effective April, 1987. This broadened mandate led to the initiation of research activities related to all sectors of Quebec housing. The two principal concerns are 1) the implications of an aging population and 2) technical innovation in residential construction and production of housing using non-traditional methods. In 1988, we prepared a report on the state of technical innovation. Meetings with individuals in the private, public, and university sectors led to the identification of three obstacles to innovation were identified: 1) the fragmentation of the housing construction industry, 2) regulations, and 3) weakness in research and development. This last observation is probably the most important of the three because, in construction, as in other sectors of the economy, one cannot escape the internationalization of world markets.

Increased competition due to 1) free trade between Canada and the United States and 2) the formation of the open European market threatens to put countries that have invested the least in research and development at a disadvantage. In Canada, few resources are allocated to research and development. With 1.3 percent of its gross domestic product dedicated to research and development, Canada occupies last place among the leading industrialized nations in this area. One-third of these expenditures are by foreign-controlled enterprises. Half expenditures are made by 1 percent of all businesses. The housing sector is composed primarily of small and medium enterprises, which have fewer resources to support research. In Japan, Misawa reinvests 1.5 percent of its sales revenue in its own research institute. Other companies spend up to 2 percent of their budgets on research. Research teams are multi-disciplinary and employ impressive proportions of professionals. National House employs 200 architects among a staff of 2,100 persons. This is equivalent to one-third the number of labourers employed there. Misawa's three basic house models each permit 300 planning options and 400 different panel dimensions. Sweden, with a population near that of Ontario, annually spends three times more than the United States on building research. That amounts to US$ 200 million per year. The Swedish experience indicates that large production volumes are not necessary to develop and use new technologies in housing construction. Swedish manufacturers produce, on average, only 250 single-family houses and 140 apartments annually.

An examination of Quebec research organizations that have increased activities in recent years revealed that almost all are in fields other than housing. More funds must be provided to interest research groups, enterprises, and individuals in housing problems. We were particularly impressed by the Innovative Housing Grant Program of the Alberta Ministry of Municipal Affairs. The grants, normally limited to $30,000 may be obtained to research various aspects of housing, including building design, construction technology, energy conservation, urban planning, and the use of computers in residential construction. This program is open to both the housing industry and to other organizations with an interest in housing. The publication and distribution of studies and research undertaken in this program is very efficient. Other provincial governments should be inspired to support housing research at equivalent levels. At the federal level, a program for residential building technology, administered by CMHC, allows a maximum of $15,000 per project. This is inadequate in terms of the investment necessary to conduct research and development of new materials, products or construction systems. It also excludes important aspects such as planning and design.

The unequal distribution of resources is another feature of housing research and development in Canada. University research continues to receive a decreasing share of national resources dedicated to research and development. Approximately 38 percent of all research and development at the university level is conducted in only five universities. Ninety-five percent is conducted in 25 of 48 universities in the country. The same concentration of resources is evident in other sectors. In Quebec's private sector, for example, more than half of all research personnel are employed by 10 percent of enterprises involved in research and development. In Quebec's public sector, 83 percent of research is conducted by two ministries. The "Centres de recherches industrielles du Quebec" carried out 97 percent of research in natural sciences and engineering. Regionally, most research and development is carried out in Ontario. In 1985, 46.5 percent of federal government research and development contracts were let in Ontario. A little more than one-half of gross national expenditures in research and development in natural sciences and engineering are made in Ontario. The Atlantic provinces receive about 5 percent, the rest is distributed equally between Quebec and the western provinces.



Quantification of research and development expenditures in housing and architecture is very difficult because data are almost non-existent. Statistics for the construction sector show an underdeveloped situation. These statistics include construction of roads, dams, and bridges, as well as buildings. This is why we say it is abnormal that in the construction sector, which accounts for 14 percent of gross domestic product, only 0.1-0.2 percent of expenditures go toward research and development compared to 1.5 percent of gross revenues for other sectors. Housing is important enough, economically and otherwise, to receive a fair share of research and development expenditures.

What part can architectural research play? When we realize the small number of researchers in planning and architecture, compared to science and engineering, we must not be surprised at current problems with indoor air quality and office lighting. Is architectural research not taken seriously? Who is to blame - the provider of funds or the architects who do not see the need for scientific research within the profession?

The study of technical innovation has led the Quebec Housing Corporation to undertake various initiatives. We are contributing to the funding of the master's program in affordable housing at McGill University. We believe that different methods of financing are not the only solution to this problem; housing design can increase affordability. We hope that others, in both the public and private sectors adopt this attitude, which favours architectural research and the development of new ideas.

Research cannot have maximum impact without accompanying development. This is particularly true in architecture. Demonstration projects are the best means of testing new concepts. We are interested in new forms of housing addressing, in particular, the increasing proportion of senior citizens. Four "granny" flat experiments are presently underway in different regions of Quebec. We are also exploring the possibilities of "accessory apartments" and "domotique" (the application of new technologies derived from computers and electronics for the control and programming of domestic functions) by conducting research on these subjects. Other projects using new construction methods will be realized soon. A tender will be called this fall for the construction of three social housing projects using prefab structural insulated panels.

To conclude, research in residential architecture must take its place among the research efforts of other disciplines. To solve this problem, architects must be present at all levels of decision-making, and find partners in the public, private and university sectors, so that housing design may take advantage of resources invested on research in Canada. Forty-four percent of business productivity gains are due to technological innovation. Residential construction plays a major role in the Canadian economy. The industry must develop for the long term to remain competitive and find new markets. However, financial resources are useless if competent human resources are not available. Thus, we must encourage the pursuit of higher education, at the master's and doctoral levels, in the area of residential construction. The issues to be addressed include:

1. The slowness of technical development and the weakness of housing research and development in Canada

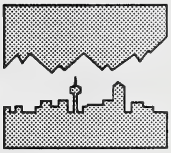
2. The internationalization of markets and research into new prospects for the construction industry

3. The decreased affordability of housing in recent years and an economic climate particularly unfavourable to first-time home buyers
4. The stagnation of residential construction activity in several provinces and low productivity in the industry
5. Rapid change in household types, due notably to the break-up of the traditional family and the aging of the population

Considering the above, increasing research and development in the area of housing types and designs for today's needs appears to be an essential step. A strong architectural research network that connects the universities, the funding agencies, and the industry should be defined to coordinate the efforts of people and groups with similar research interests.

Mr. MacDonald: As I said yesterday, the Government of Ontario, because of escalating housing costs in southern Ontario, recently embarked on a new course in housing policy. Ten years ago it delegated land-use planning authority to local municipalities while retaining decision-making powers in matters of provincial interest. A few years ago, the provincial government deemed the cost of housing to be a matter of provincial interest. A housing land-use policy statement issued in 1989 states that:

- All planning jurisdictions, including municipalities and planning boards, must consider the implications of their actions on the availability of housing within their region
- All planning jurisdictions must maintain, or attempt to maintain, a ten year supply of residential land
- All planning jurisdictions must update their plans to incorporate servicing policies to identify how growth and residential development will be accommodated
- All planning jurisdictions must establish a three year running supply of lots at the draft approval stage or at the registered plan stage



The policy requires that a specific fraction of residential development must be affordable. The definition of affordable is that, within a planning region, 25 percent of the new housing units must be affordable to households that are in the 60th percentile income range. This means housing must be affordable to 40 percent of households. Currently, only 5 percent of first-time buyers can afford an average house in Toronto. Increasing that to 40 percent is a substantial leap. In the greater Toronto region, the 60th percentile household income is $55,000, so the price of an affordable house is $157,000. The current average price for ground-related housing is $250,000. Affordable homes must be smaller, on smaller lots and more carefully designed.

Municipalities, and the building industry, were advised that this policy was being developed. However, municipalities were shocked at the level of detail required by the provincial government, and the speed with which enforcement of the policy was initiated. The Ministry of Housing began to intervene at Ontario Municipal Board hearings, where municipal plans are reviewed. The Ministry is especially supporting provisions for in-fill housing and intensification where, for various reasons, rate-payer groups resist change. The Housing Advocacy Task Force has intervened at five or six Ontario municipal board hearings. I believe that opposition to affordable housing is lessening as more people become familiar with the difficulties of relatives and friends in attempting to purchase homes. After being informed of the housing policy statement and being shown what can be done, the Ontario Municipal Board has ruled in favour of intensification in the last three or four in-fill housing cases. Stringent R-1 and R-2 zoning has been relaxed over extensive areas. The housing advocacy task force and the policy branch have been visiting municipalities to explain ways of implementing this policy. The planning jurisdictions are becoming accustomed to the new circumstances, and it is amazing how necessity breeds invention. In the greater Toronto area, most municipalities have stated that they will allow an accessory apartment without increasing parking requirements because the large number of empty-nesters has substantially reduced household formation.

What does affordable housing look like? One study that was done by Flies, Gates, McGowen, Easton Architects and Clayton Research Associates determined what it would take to produce affordable housing (according to that formula) in Oakville, Brampton and London. The two former are very near Toronto and the latter is 200 kilometres away. In Brampton, 40 percent of the population could afford a dwelling costing $148,500. We realize, as Prof. McKeller said last night, that people prefer detached housing, at least for ground-related housing. The first design proposal was a detached house with an accessory apartment over the garage. The apartment would accommodate one- and two-person households with immediate access from grade. A 50 m^2 (500 ft^2) over-garage apartment could be built for $20,000 if constructed at the same time as the house. This would give the first-time buyer a very affordable unit. Placement near the front of the lot provides good views from the apartment. The garages would normally serve the main house, while the rental unit would normally use street parking. Another affordable design is the walk-up, two-storey, two-bedroom apartment, costing $128,000. The key to acceptability is to avoid large concentrations of any one type of housing. The next larger affordable units are three-bedroom street-oriented townhouses and semi-detached dwellings. These have a floor area of 115 m^2 (1150 ft^2), so they are not small. Roadway widths are reduced to cut land costs. In the immediate Toronto area, the semi-detached is not affordable since it would cost $165,000. However, in London, this house could be sold for $106,000. Market studies show that first-time buyers would be quite happy to live in this type of house. They do not need a 15 m by 30 m (50 ft by 100 ft) lot. These lots are approximately 12 m by 21 m (40 ft by 70 ft). Fifty units would be built in clusters separated by open space.

One might question why the lot sizes would be reduced to the extent proposed in these examples. While land costs are high in southern Ontario, other concerns affect views regarding lot size. Watering of lawns creates enormous demands for treated water. Consumption is typically 700 litres (150 gallons) per household per day. New subdivisions with lots of 500 m^2 (5,000 ft^2) increase water consumption considerably.

In conclusion, architectural research in detached housing is very important. Architects can find ways to design flexibility into detached dwellings so that income producing apartments can be readily incorporated. Such flexibility affects services such as plumbing and heating as well as the spatial organization and appearance of the home.

Dr. Friedman: I will dwell on the home itself, what has happened to the house, and the ways in which architects can contribute to research on detached dwellings. The past two decades have cast a shadow over the traditional attachment of North Americans to detached dwellings. The reasons are diverse and most of them have to do with economic factors:

- The costs of land, infrastructure, and maintenance have almost doubled in most Canadian cities in the last decade. Most prospective first-time buyers cannot afford a home.

- Households have become smaller. In 1956, 1000 persons were typically accommodated in 245 dwellings. By 1985, it took 340 dwellings to house the same population.

- When we discuss housing, we tend to think of the middle class. We tend to ignore the fact that there are people below the middle class. The sad fact is that there are 200,000 empty bedrooms in Canada for every homeless Canadian. We are not addressing this problem at all, we are addressing the middle class.

- The composition of the household has also changed. Only 7 percent of existing households are traditional single-income nuclear families. Thirty percent of Canadian families are two-career couples who have chosen not to have children at all.

- People in Canada move, on average, every 5 years. In its life-cycle, the typical Canadian home will accommodate 8 households with different needs. We are designing a structure that will house 8 different families with different needs, different socio-cultural backgrounds, and so on.

- Household activities have changed in the last two decades. People are entertaining

> themselves differently. The video machine has replaced the movie theatre as an entertainment centre. People are staying indoors more. Prepared meals warmed up in a microwave are replacing meals cooked on a range. Single-person households, now a significant portion of the population, do not need the kitchen designed for a traditional family. They do not need large ranges. Many homes have computers, turning part of the house into a data processing and communications centre.

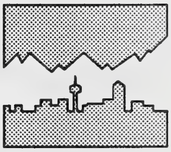
My colleague, Prof. McKellar, wrote in his report *Design Strategies for Affordable Homes* [1], that semi-detached units, row houses, and apartments are gaining an increasing share of the ownership market due to lack of detached housing in comparable prices. Given that detached housing is decreasing in affordability, one may ask whether the detached dwelling will lose its dominance in the Canadian urban scene to denser housing types. This is a crucial question. Prof. McKellar stated that detached homes are still very popular, but there is an affordability crisis. The official policy of the Ontario government is to build denser settlements. I believe that the detached home will continue to be part of our urban heritage, primarily because of its historical roots and because of the values that this housing form represents. Canadians are wedded to the idea of private property. The house will continue to be the symbol of good citizenship and social status. However, in the 1990's we can expect changes in the form, the function, the production, and the marketing of houses.

What can architects contribute to research on detached homes? They can start by changing their attitudes, which is important. Architects should not overlook the fact that the average person's taste in domestic building is conservative. Styling was the major drawback of housing proposals of the early modernists; they were well-intentioned, but their projects were never accepted by the public at large. The inability of some members of the architectural profession to alter their elitist, and often patronizing, attitude to the marketplace has unfortunately continued in the last decade. According to sociologist Robert Gutman, this is a serious obstacle. I quote, "The self-conception of architects is contrary to what housing producers and consumers expect" [2]. Architects will also have to become much more conversant in the economics of housing. They will have to collaborate with developers and builders in a meaningful way rather than as stylists, designers of envelopes or facades, but with an understanding of the housing market. They must work with developers from the earliest stage of the design process, knowing what these developers and builders are thinking, if they want to communicate effectively. This will force architects to change some of their views regarding design. They will have to learn to manipulate a new architectural vocabulary: aluminium siding rather than bleached cedar, vinyl flooring rather than marble, mass-produced items rather than designer pieces. Accommodation of sub-populations with their various space needs is consistent with research and development of advanced communication tools such as computers.

As I have already shown, today we have a very diverse market. Single-parent families occupy 12 percent of the market, yet we still conceive of houses in terms of three- and four-bedroom dwellings; we have to change our terminology. We have to design dwellings for single parent families, for single people, for empty nesters, rather than seeing the market as a monolith. We therefore have to devise the means to be more flexible in our design.

At McGill, we are working with developers and builders on computer programs that allow a client to visualize types of dwellings. The programs allow architects to show clients what is available, discuss needs, alter designs, and immediately assess the cost of alternatives. It is also expected that use of prefabricated components will grow to take advantage of economies of scale. We found, for example, that prefabricated homes currently cost 10 percent more than conventionally built homes, which is a paradox. The purpose of mass-production is to lower costs. I believe that architects can make a contribution. They can assist manufacturers and industrial engineers by designing homes that can be built more quickly. As an anecdote, we ran into a deadline problem with the demonstration house that we recently built. Like many architects, we worked to the last minute. The manufacturer had to produce the house in ten days. Believe it or not, he did it from start to finish. This shows the power of prefabrication.

Through architectural research, we can demonstrate to builders that affordable housing can be profitable, and to municipalities that it can be an urban asset. The McGill School of Architecture worked with municipal representatives and a builder to demonstrate the economic attractions of affordable housing. Municipalities resist affordable housing due to the fear that such housing will look like slums. We insisted on being involved in the cost-benefit analysis. This showed that the municipality will make more money from taxes by building affordable homes. The mayor's reaction was that this would appeal to the council. The builder told us that the second-time buyers' market was exhausted in this area. He recognized that his market had to be first-time buyers. We demonstrated to him that, although he affordable housing meant smaller lots and smaller homes, his profits would be greater. We demonstrated to the municipal council that it could be a very pleasant neighbourhood. Any of you who have visited cities like Newcastle, England may have seen the attractive neighbourhoods of very popular small brick homes that have aged beautifully.



To sum up, the main task of architectural research will be to provide practitioners, manufacturers, municipalities, and purchasers with means, ideas, and data that will contribute to the development and acceptance of these new housing forms.

Prof. McKellar: Architects must adopt a long-term research agenda. We should not be continually sidetracked by topical issues such as the economic problems of the moment. Interest rates will go up and down; we can study architectural problems related to these fluctuations, but my concerns regarding the detached house focus on the long run. The detached house is intimately connected with our culture. After seeing the United States build about 70 million new homes over the past 45 years, other countries around the world are saying "It works." Architects have to understand that the important issue is not so much the design of the house as its preservation as a cultural artifact. We have to protect the means of producing these houses.

I believe that we have to strengthen our means of production because of changes in the regulatory environment in which builders operate. There was a period when small contractors built four or five homes each year. Their main asset was their own labour. The small builder cannot survive today because of increased regulation - building permits, public meetings, and so on. They can't find the time to be on-site and at city hall.

We must recognize that the fragmented character of the housing industry is a strength in dealing with scattered sites. Technology has enhanced this advantage. A builder can now buy manufactured windows, doors, and other value-added components. At the same time, small builder requires far less capital investment than factory-based producers of housing. Technological advantage does not mean factory production of the house. In fact, the greatest breakthrough in housing technology has been the hand-held power tool. In contrast to the advantages of such tools stands NHAB's "Smart House" technology. I believe that this will not be the success that many expect; it could be a marketing disaster in the United States.

My experience as a consultant to Misawa of Japan and other housing producers with a reputation for using advanced technology suggests that it is not a panacea. Misawa is not, in fact, a technically advanced company. It adopted a panel building system developed in Canada and typically borrows other techniques developed outside Japan. But it does have a marvellous marketing and sales capacity. The architects who work there are essentially employed in marketing and sales. My words of warning are "Do not get caught up in production technology." We should not be advocating building systems and housing factories. North America already has an excellent system for producing housing and the rest of the world acknowledges this. Architects must avoid getting caught up in rationalizing the supply side, as I said last night. Let us rationalize the demand side. Our research should protect a proven asset, our distinctive way of building homes.

It is important that architects undertake research related to culture as well as to technology. Every time architects discuss housing, they want to talk about technology. Our technology is reasonably good, and it takes a long time to introduce technological improvements. It takes approximately 13 years for a new technology to be adapted, even something as apparently straightforward as drywall or prefabricated trusses. Only one out of ten technological innovations will survive in the marketplace.

Surprisingly, North America spends a lot of money on research and development in housing technology, but it is at the materials level. For example, at MIT, we are currently involved in a project, supported by some 10 companies that have each contributed substantial financial resources, to develop a new roofing system that will integrate structure, thermal insulation, and moisture control. A lot of money is spent on materials development where there is obviously proprietary interests. That part of the industry is fairly healthy.

Architects must get closer to industry. Even practicing professionals do not get very close to this industry. In schools of architecture, discussing cost constraints or dollars is frowned upon. In our own real estate program, the architecture students expressed their resentment to our existence by running up a banner that said "Developers suck." I believe that attitude comes from the academic staff. There is an attitude that getting close to industry is bad. It just happens that there is an industry that builds cities, of which architects are an important part.

Architects have to take risks. We cannot sit back and dictate solutions to people in industry, expecting them to take all the risks. We happen to live in a society where there is both risk and reward. By saying that architects have to get closer to industry, I mean we have to take risks. If we think we have a good idea, then we should be the ones putting our time and money at risk. We have not exposed ourselves to a great deal of risk in this way.

Architects have to understand that we operate in a market system. When we deal with affordable housing, we should find out what the purchasers want. We should find a way to provide housing that offers choice. The market shows us that so-called "flexible houses" do not meet the need for household change. For example, people adapt by moving. We have to go beyond trying to solve the affordability problem through design. We have to get people into a marketplace where they can express those preferences. In the United States, the only people who can express choice seem to be the wealthy elderly. At the lower end, very few people are entering the housing market. In 1948 the average size of a house in the United States, and probably in Canada, was 110 m^2 (1200 ft^2). The average size today is 174 m^2 (1800 ft^2). Although concern is expressed about affordability, it is difficult to get smaller houses accepted. Getting architects to understand how markets perform, and why, is of long-term importance.

If architects are going to do housing research, it should link the existing means of production with the market place. One of the issues with which North American developers are currently wrestling is that of building communities as opposed to subdivisions. They can find expertise on panel systems and they can find expertise on glues. What they can't find is expertise on ways of building communities. They ask "Who are the experts?" They know engineers have not done justice to this issue. They are not sure whether architects have either. By "community" they mean the ephemeral quality of culture. They are not looking for a house plan. Their consumers are looking for a sense of community. I do not believe that having Seaside, Florida replicated all over North America is a solution.

Seaside received wide recognition in the U.S. press and developers have flocked to the architect for similar concepts. But there must be other architects who are equally talented. One way architects can connect the means of production with the market place, is by going beyond the design of individual houses to the creation of communities. Seaside is one example, but we need many more.

We must find ways the architectural profession can help maintain an industry that has served our society over the last forty-five years by building what are looked upon by the rest of the world as very appropriate residential environments.

Discussion

Mr. Duff: I do not agree with Prof. McKellar's view of the building industry. The small builder is archaic.

Prof. McKellar: The small builder is a strength of the housing industry.

Mr. Duff: The building industry is threatened by the internationalization of markets. Canada only produces 12-15 percent of housing off-site while in the United States, the figure approaches 56 percent.

Prof. McKellar: Your numbers are wrong. Modular housing represents 2 percent of the marketplace in the United States, while mobiles represent perhaps 15 percent of starts. The rest are built using traditional methods. My question is "Who cares?"

Mr. Duff: We should care because we are not isolated. We trade with other countries and we should know what our competitors do.

Prof. McKellar: Would 36 percent panelization mean that we would be more competitive in a global market?

Mr. Duff: Panels can be put on trucks for export, from other countries to Canada or from Canada to other countries. That is what the Swedish are doing in New England

Prof. McKellar: Do you know how many Swedish houses have been built in the northeast - 200 in the whole New England region over the last five years.

Mr. Duff: I count about 800. I cannot share your view because we are not isolated as a country and as a trade market. There is a big future for trade. Declining birth rates will lead to a decrease in the demand for housing in Canada. To survive, the housing industry will have to find markets in other countries.

Mr. MacDonald: Contrary to Prof. McKellar's position, I think we have to provide alternatives to the detached house. The culture of the detached house is associated with the nuclear family. There are many single parents and single persons who might prefer a detached house, but who do not have any aversion to moving into something a little different.

Prof. McKellar: I did not mean to be critical of that program. Sometimes we forget the fact that, if we gave subsidies to first-time buyers rather than built them a house, they might be able to enter the market.

Mr. MacDonald: No, I disagree with your point that the rest of the world prefers the detached house that has been common in North America, and therefore we have to do everything we can to protect it.

Prof. Kayari: Prof. McKellar's enthusiasm for the detached house is obviously upsetting some people. The impression has been created that you are eager to argue for the detached house as central to our culture. Perhaps the detached dwelling would be less objectionable as a model if considered in terms of the attributes that make it attractive to people. Such attributes were identified in studies funded by CMHC, examples being: unit-related parking, ground-related entry, and a private outdoor area. In many respects, the work was similar to the projects shown by Mr. MacDonald. It is not so much that there has to be a separate dwelling on a separate lot, but that the household should have an entry sufficient to be a symbol of what Prof. McKellar called good citizenship. If one sees the dwelling that way, it can be both traditional and modern at the same time.

When I went to school, I was told that the ratio of land to dwelling unit cost was about of one-to-three. In Ottawa, the ratio is currently about two-to-one. If we focus on unit cost, we may be missing the point. We should also consider land development. Old concepts such as zero setbacks may provide less expensive alternatives which also contribute to community building both socially and physically.

Mr. Bobrow: What kind of research is being done to explain to the Russians that they ought not adopt foreign technology or methods, but should alter their present mechanisms?

Prof. McKellar: The only thing I can tell them is do not look to Germany, Canada, or the United States. Examine what happened in northern Russia a long time ago, when people survived under very harsh conditions and built magnificent houses. We are trying to get them to look inwards as opposed to outwards. As you well know, there are hundreds of Canadian, American, German, and Italian firms over there, willing to say that in this new global environment of housing technology we should use panel construction and so on. I think that is going to be the big problem.

Dr. Friedman: I would like to refer to a point Prof. McKellar made about the home building industry. I know it takes a lot of time to introduce changes, but it some of the things that cut production time are technological innovations. Dry wall was a technological development. Somebody had the foresight to conceive it. Somebody had the foresight to conceive prefabricated trusses. I am not suggesting that technology will solve all problems, but somebody has to do that work.

Prof. McKellar: On a comparative basis, we spend more on technological research in North America than does Japan. Often, when we compare countries, we use statistics without understanding the underlying reasons for the differences. The North American housing industry is not vertically integrated. In Japan, the research and development money is spent by large vertically integrated companies. Misawa of Japan is vertically integrated. Its operations span from the production of raw materials to the finished house. Our companies will never be vertically integrated because we do not have national markets in the home-building industry. Our industry is highly fragmented but many other countries, including Japan still seek new materials and products in North America. The reason is that we do a lot of research and development at that level - adhesives, truss design, and so on.

Mr. Duff: What is Misawa doing in its lab. It has a huge laboratory.

Prof. McKellar: I spent 6 months in Japan studying the housing industry. Misawa's lab is a great marketing ploy. It is more significant that some 35 percent of Misawa's employees are in marketing and sales. I came across one Japanese housing factory that had an automated line just for visitors. The Americans came over and requested "To see this new technology. We want to see the automation and the robots." They show it to visitors who write articles about automation in the Japanese housing industry. They have never produced a house on this particular line. Misawa gave MIT'S Media Lab $10 million last year for research. It is interested in television and video for the home. This is the same company that wants to have sales personnel equipped with computers. Their society is very attuned to gimmicks. As we move into a global world, we have to be very careful about how we interpret what we observe.

Our housing industry is reasonably good. We think we have problems with affordability, but our house prices are generally 2 to 3 times average annual household income. In many other countries, house prices are 7, 8, and even 11 times the average annual household income. We have to be careful when we make comparisons with other countries.

Mr. Bobrow: It may not be well understood that the detached house was 95 percent industrialized 20 years ago. The level of industrialization should not be measured by whether a house is produced in a factory. The degree of industrialization is found in each of the components that goes into a house. Dry wall is a very industrialized product. It enables a worker to operate efficiently when using aids such as prepared compounds, special stilts, nailing tools, and so on. A principle cause of the failure of prefabricated buildings was the attempt to industrialize the remaining 5 percent of production. The North American production system is radically different from those in Europe or Japan. This is significant for long-term research. If we use robotics in construction, should we use it to build apartment buildings or to build detached houses. The industrial content provides the answers to these questions.

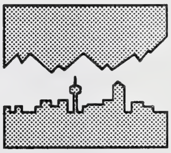
Prof. Kayari: The point I see is that we have to take into account the broader picture when we develop a research initiative to ensure that it will yield worthwhile results. We have to be wary of research efforts that are too narrowly defined.

Dr. Piché: Changes in socio-demographic trends may have an impact on home ownership. For instance, I have studied the housing needs of single parent families. It is apparent that they are not looking for detached housing. Generally headed by women facing a wide range of tasks, these families do not want to deal with home maintenance. They are also seeking the security and safety offered by collective living arrangements. These households are growing in number. Most Canadian children will live in a single parent family for some period of their lives.

Changes in the law may also modify attitudes regarding home ownership. In Quebec, civil law has just been changed; unpopular rules applying to property during a divorce have made home ownership less attractive.

Finally, cultural trends may also change. I am sensitive to the cultural appeal of the detached house, but I think it is changing. The Quebec triplex was a very effective form of housing that almost disappeared due to the popularity of the detached dwelling. Today, people are developing a renewed appreciation of this triplex. We tend to borrow a lot from American housing research and forget our own cultural heritage. A lot of work needs to be done in the area of cultural research.

Prof. McKellar: I concur that research has to be done on alternate forms of housing, but it has to go beyond the dwelling unit. Research should be done on the environment within which new house types will be placed. Housing types like the triplex, also found in Boston, were successful because the neighbourhood had a structure that supported the occupants. There was a lifestyle associated with this housing. Detached housing is not the only choice. However, if we develop alternatives, we have to consider neighbourhood structures that will make these units successful homes.



Mr. Bazley: If the core of housing issues is cultural, do we have a problem given that a typical house will have eight or so different owners over the course of its life? In this time, culture will change and the owners will come from different cultural backgrounds. Are architects equipped to handle such cultural research? If not what do we have to do?

Prof. McKellar: In responding to the first point, the way we build a house allows each of these eight families to mold it in certain ways. A stick-built house and the associated systems are, in a sense, high-technology at the material end and low-technology at the house. A great attribute of our houses is they are not difficult to change. In fact, this is a very important hobby for many people. I think the building technology we use in Canada is very consistent with the notion that the occupants be self-sufficient.

Whether architects can contribute is a difficult question. When people ask "Do you know an architect I can use for renovation?", I usually say I know a few small builders who will likely do what you want. When I had my practice, I noticed that it took me quite a few years to teach an employee to be receptive to the client's wishes - to not have the client call me and say "It's my kitchen! I don't want it black and grey." The answer to the second part is architects could contribute, but I think that sensitivity to the homeowner has to be conveyed in the schools.

Dr. Friedman: As one who sees a personal future in housing, I have tried to involve students in my work. In the last two years, only 3 students out of 70 selected housing as the subject of their senior undergraduate project. Most of them wanted to do museums or galleries. There is no enthusiasm for housing in the schools. We would like to find some innovative ways to encourage students to be more involved in housing.

Mr. Gies: Prof. McKellar has said that developers are looking for ways to create communities, yet people live and work in different areas.

Prof. McKellar: When buyers look for a home, they are also looking at the neighbourhood. They are looking for certain symbols in that neighbourhood. We may be creating new housing prototypes, but have not done enough work on the setting for these homes. When the Urban Land Institute and the AIA in the USA, and the RAIC in Canada, give design awards they never show the setting that lets you know whether the house is going to work. How you take one prototype and multiply it 50 or 60 times?

Mr. Gies: It is not the neighbourhood in which we grew up. It is not an appropriate social setting.

Prof. McKellar: It may be for some people. Developers are also recognizing the trends to which Dr. Piché referred. The traditional family is becoming a minority in the housing market. Developers are asking, "What kind of neighbourhoods do these new households want." In the United States, we have two problems: "NIMBY's" and "LULU". NIMBY stands for "not in my back yard;" that is: "yes, we need daycare, yes we need a YMCA, but not near my home." LULU stands for "locally unwanted land use." Developers are trying to overcome the resistance they find when they propose projects including elements such as affordable housing. Residents in surrounding areas are objecting strenuously in their perceived self-interest.

Dr. Baniassad: Some of the work we are doing in Halifax in an architectural study of the detached house leads to conclusions consistent with Prof. McKellar's position. Although, in terms of construction, the detached house can be regarded as a problem in itself and be researched, in terms of architecture we find it difficult. The architectural problem does not end with the dwelling. Its proper boundaries are, in fact, far beyond it. To say the least, they extend to the first accessible place where there are shops or where there is open space or where there is a school. Architecturally, the boundaries of the problem are not the detached house but its significance. That is to say, the urban fabric to which the detached dwelling relates. One redefines the problem in architectural terms in order not to miss essential parts of questions of housing and settlement. I think it is possible to establish, in a simple way, that the architectural boundaries are beyond the individual unit.

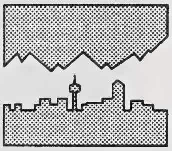
The second point has to do with the interest of students in housing. If one operates with a view of architecture in which housing is not a significant part, then I do not see why one should expect any student to take it up. If a school operates with a view of architecture in which housing is significant, then it is untenable to go through that study without touching on the house. One may touch it in different ways, but it seems to me this issue of students being or not being interested in housing has to do with whether a school has taken it upon itself to establish a view of architecture that encompasses housing. If a school fails to do this, its program becomes an anecdotal mosaic of topics having to do with buildings. I know of some schools where the very idea of architecture is rooted in housing. Given this, I cannot believe that investigation of housing cannot be taken beyond technological concerns as the significant point of departure.

Dr. Friedman: I fully agree with you. We sometimes allow the emphasis to shift to other interests. McGill's mark of excellence, as you know, is Moshe Safdie. I agree with you that the schools should operate with an understanding of the architectural importance of housing.

Dr. Baniassad: The problem is a philosophical problem. It is not one of urging students to be socially conscious. If housing does not have a central position in architecture, then one is fighting a losing battle. That is where the problem lies. In many schools of architecture, the staff show they are socially conscious by organizing what they call a housing studio, usually in a marginal urban area. I think it should be more central to the curriculum. If it is not important, then it can be treated in technological terms.

Prof. Haldenby: Manfredo Tafuri said "there is no criticism, there is only history." I think we are witnessing a confrontation between a modernist view that everything is criticism, and that everything can be restructured based on *a priori* principles. Professor McKellar and others have pointed out that modern architecture has tried to reform something as ubiquitous and straightforward as housing in very utopian ways and without carefully examining its history. Understanding this is very important. I think it is consistent with some of the arguments that Mr. Mertins made. He is proposing a paradigm that would allow us to comprehensively examine housing as a cultural phenomenon in a historical context.

In respect of the pessimistic statements relating to housing and architectural education, I have to say that my experience is different. In the last three years, the number of students doing theses on housing and other issues of settlement, by their own choice, has radically increased in our school. In the lower years, our approach to questions of urban design has shifted away from the rationalist tradition of urban reconstruction, the perimeter block and other concepts that were fundamentals of housing work and urban design in architecture schools through the last decade. We are joining many other schools in addressing issues of settling the metropolitan fringe. The danger is that these problems are used to disguise philosophical programs. In many cases, the students are not examining the substance of these issues. They are using these issues as a "screen" for a deconstructivist, nihilist aesthetic. However, it is possible that the discourse is changing and that we may make some progress.



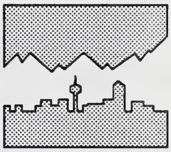
Notes

1. DiPasquale, D. and J. McKellar, *Design Strategies for Affordable Housing.* 1987, Centre for Real Estate Development, Massachusetts Institute of Technology:

2. Gutman, R., *Architectural Practice: A Critical Review.* 1989, Princeton, NJ: Princeton University Press.

THE DEMAND AND NEED FOR ARCHITECTURAL RESEARCH: THE ARCHITECT'S RESPONSE

Denise Piché



To any keen observer of our society, it is evident that there is a demand and need for architectural research, and that this demand will grow in the future. Therefore, it seems to me that the important question to be addressed is the architect's response to this demand.

A few introductory statements are useful to our discussion.

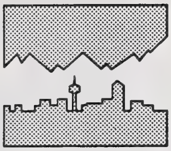
First, there is a need for architectural research. It is obvious that knowledge regarding architecture needs to be developed and that there are problems to be solved. Recent developments in architectural research can easily illustrate research needs in terms of theory building and applications:

- urban morphology and architectural typology
- the study of urban life, public space and built heritage
- the reinterpretation of the history of architecture
- the development of methodological tools and processes that find application in programming: post-occupancy evaluation, impact analysis, computer simulation, human factors techniques and the development of environmental norms and guidelines for special user groups;
- climatology and energy use

These are all areas that have grown within the discipline either because of its own state of development or in answer to its perception of the needs of society. This list should expand in the near future to include such topics as:

- the impact of built form on the quality of the environment and the protection of nature
- low-cost housing and new planning tools for the Third World
- sophisticated means of project presentation and evaluation
- technological improvement of building components and systems
- new built forms for a changing demographic situation
- innovative use of construction material.

Second, there is a demand for architectural research. As well as a need for research due to the state of knowledge in the discipline, there is an external requirement due to the state of development of our society. These agendas



for research can overlap, but they are not identical. There has been, as yet, no formal evaluation of the external demand for architectural research in Canada. But a brief examination of the state of the building industry, the activities of local governments, and the potential contribution of the built environment to well-being, confirms that there is such a requirement. The requests addressed to the schools of architecture and their faculty should reassure us that more is required than we can accomplish [1]. Moreover, where the requirement is not acknowledged, it can be demonstrated, as the Affordable Homes Group at McGill has recently shown. The requirement, or demand, is there and so is funding. Architects have access to many more granting agencies than any other disciplines.

Third, the intellectual life in architecture is healthy and lively. Whether architecture is conceived of as a fine art, as a profession, or as a scholarly discipline, the intellectual debate is everywhere vigorous. Journals, conferences, publications, and other productions are growing in number (e.g. *Architectural Design* and the *Journal of Architectural and Planning Research*, and the academic journals published by various schools of architecture). Associations such as the Environmental Design Research Association (EDRA) and the Association of Collegiate Schools of Architecture (ACSA) are doing their best to promote research in architecture.

Fourth, it seems that architects are ready and motivated to invest in research. However, this particular point must be assessed: why are they interested, in what type of research and in what context?

Is there a problem in architectural research? There is, we must admit, at least a problem of perception. Some of the documents produced by the RAIC, by the professional associations, and by the schools of architecture, as well as some of the comments made during the present seminar, certainly give the impression that architects think they do not have their fair share of research and development budgets and that their type of research is not well understood or recognized by research councils and administrators [2].

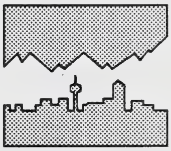
The architect's response to the demand and the need for architectural research must be explained in order to define strategies that will be effective in stimulating research. However, we must not expect any magic recipe, nor any best way to development: social change is gradual and the result of many different forces, according to Popper's wisdom [3]. This is why a first step in our inquiry should be an exercise in "mapping the world", the apt concept used by Prof. Taylor in his presentation: mapping the world of the discipline, mapping the world of the profession, mapping the world of architectural research, mapping the world of research as an institution. Although we have yet to collectively map the world of architectural research, I shall raise a few questions in order to identify some of the structural obstacles that are hindering the harmonization of architects' response with research demand and need. A call for tolerance and diversity is underlying my position; these are two values that are implicit in a mapping exercise and that could change the profile of architecture in the next decade if ingrained in professional culture.

What is architecture? What is research? What is the nature of architectural inquiry?

Architecture has been defined in many different ways over time and according to trends, so much so that definitions of architecture easily become a source of misunderstanding. Let us look at one of the definitions reported by Shadbolt and Carrothers: "Architecture represents not only the art and science of making buildings, but also a way of thinking. Architecture is both the accumulation and reflection of wisdom about dwelling with others on an inhospitable planet" [4]. To say the least, architecture is multidimensional.

It is a legislated *profession*, with its own set of interrelated activities, tasks and convictions. In a market economy, it is a *business* associated with the building industry. As master builders, or coordinators, architects are also *managers*. By virtue of their convictions and preferences, they are *artists*, *building scientists*, and, nowadays, *specialists of the built environment*. Within the profession, we can distinguish "rank and file architects," or craftpersons who apply their knowledge to their practice in a professional manner, and creators, or artists, who carry their tasks to new summits of accomplishment in the expression of the social, technical, and aesthetic ideals of their time. Within these two groups, we find various shades of practitioners according to their convictions.

As a discipline, architecture is multidimensional. Therefore, its knowledge base, its main justification as a liberal profession, is itself multidimensional. Although the knowledge required to practice the profession is determined by the profession, there is no easy consensus within the profession and the schools as to the right balance among the various dimensions [5].



Architecture is an *art*, a fine art. In this sense, it is an artistic discipline supported by doctrines. Is it a science ? If science is concerned with the theoretical construction of truth, then the practice of the art of architecture is not a scientific practice, although the knowledge and skills required to produce architecture rely on the accomplishments of science. As an art, architecture can be the object of science (for instance architectural history is an object of study in the humanities), but it is not normally the subject of science.

Architecture is also a *branch of learning*, that has developed its own traditions, concepts, procedures, and world views. Compared with other branches of learning, architecture is confronted with a large number of notions and approaches. Moreover, the current trend seems to favour diversification rather than integration. For instance, architecture is doctrinal when it tries to specify the nature of its object according to the conditions of the time; it is part of the humanities when it is studied as the production of human culture; it is multidisciplinary when it bears on the understanding of the build environment, but is quite disciplinary when it develops an understanding of the formal, dimensional and spatial attributes of the built environment.

On the basis of this very limited and simplified overview of architecture, we must now seek to define research and to identify where and when research is a relevant activity in architecture.

There is a common use of the word "research" that should be dismissed for the purpose of our discussion. When my twelve-year-old son does research, he is pursuing a personal endeavour, but he is not working at the development of knowledge. When an architect and a lawyer are looking for information in order to solve a problem, they are doing professional research. A novelist, a painter, or an architect may all do some research in order to create, but the end product is a particular expression that is not understood as a truth, although it might reflect reality and truth. In neither case is research the discovery of new truths or a new understanding of reality. Although Schon's reflective practitioner integrates some of the rules of research in the pursuit of excellence, the aim and result are not the production of knowledge [6].

Nobody would disagree with the definition the dictionary gives of the word "research": "a systematic inquiry aimed at the creation of knowledge and understanding through critical approach; an investigation directed to the discovery of some facts by careful consideration or study of a subject; a course of critical or scientific inquiry" [7], nor with the attributes David Roth has listed: "research must be disciplined and documented, public, applicable or generalizable." I would add: "it must be systematic, aiming at new knowledge, and suited to later extension or development."

On the other hand, it is not useful to idealize research. If we define it functionally as what researchers do, we must conclude that researchers do all sorts of things. During the symposium, this was echoed by the "anything goes" and the "something worth doing" proposed as definitions, albeit skeptically. To set the house in order, we can try to map the world of research.

The realm of knowledge has been very clearly presented by Dr. Stein, with reference to Habermas. There seems to be a consensus that science as manipulation of the physical world, the humanities as the interpretation of the world, and critical knowledge as the motor of change are all relevant to architectural inquiry. Prof. Shadbolt and Dr. Carrothers proposed the classification of architectural research into four types: 1) conventional research, 2) architectural theory, 3) architectural reform and 4) fundamental research [4]. I find the distinctions interesting, but have some difficulty with differentiating architectural theory and fundamental research. I would be tempted to keep to usual categories such as fundamental research, applied research, action research, critical research, and development ("R and D"). Architecture encompasses all these types of research, not to mention that it is also an art. Finally, with reference to the main Canadian institutional research divisions, architectural research can be done from the perspectives of the humanities, the social sciences, and engineering.

We may conclude that "normal" ways of looking at research are not completely extraneous to architectural research and can be employed in this discipline. However, architecture has its own peculiarities, which have raised two types of questions during the symposium: 1) those related to the intellectual debate on the nature of architectural inquiry and 2) those related to the pragmatic concerns of carrying out architectural research.

Three preoccupations raised belong to the first type: 1) the unification of knowledge and theory building, 2) the relationship between theory and practice, and 3) disciplinarity and multi-disciplinarity.

First, some of us, Dr. Baniassad and Georges Adamczyk [8] included, are dissatisfied with the fragmentation of architectural research and knowledge, and are searching for a framework for architectural inquiry. Can architectural research mature, unless it develops a theoretical structure, concepts, and methods that will unify the field and allow us to assimilate research findings? I find this desire for theory-building legitimate. A discipline cannot evolve without some theory-building. However, because there is no predetermined road to powerful theories, and because the discussion of research findings can stimulate the development of general concepts, I think we must work at this task while also encouraging a variety of research. We certainly need more forums where architectural epistemology could be discussed, forums that would reinforce the status of architecture as an intellectual enterprise.

Second, Dr. Baniassad has suggested that architectural research should be grounded in ordinary practice. He is supported by Professor Shadbolt, when he says that architectural research is aimed at improving the quality of building and the effectiveness of practice. This concern for applied research is an important part of the need for architectural research, but is it the sole dimension? Moreover, is it a sound basis for defining the scope of architectural research? Does research have to be utilitarian and, as Romedi Passini has observed, how can we predict utility? We have to better articulate the links between theory and action [9], between architecture as a discipline that extends knowledge and architecture as a profession that applies knowledge.

Although society expresses needs for research that must be taken on, knowledge has a logic of its own. Medicine would not have evolved without the development of research on life and the human body. I think the specific object of architectural research should be the *built environment*, including the 90 percent not built by architects. Because research is concerned with understanding, architectural research should not necessarily aim at immediately improving the effectiveness of practice, especially practice as defined at a particular time.

Third, a malaise affects the multi-disciplinary aspects of much of the research being done in architecture. During the symposium, many referred to the need for disciplinarity, the search for the specificity of architecture as a branch of learning. I think that disciplinary approaches are unsuitable for the study of the built environment [10] and, from a purely corporatist point of view, I believe that the scope of architectural research should not be restricted. On the other hand, form-making at the scale of buildings is an activity unique to architects. If we are to address the specificity of architecture, we should be examining this activity. It is surprising that the study of form and space has been largely ignored during this symposium. However, design as a means of inquiry has been the object of helpful presentations by Dr. Baniassad, Professor Clipson, and Mr. Mertins (see his discussion of "constitutive interpretation"). They open up avenues for further discussion on the conditions under which design can be considered to be a form of research. Are the general attributes that define research applicable to this means of investigation?

Pragmatic concerns regarding the means of carrying out architectural research have been more plaintive than analytical. Before investigating strategies for gaining more support for architectural research, I would invite further mapping of architectural research and research institutions. First, we must remember that numerous research activities are not normally subsidized as research projects. Theory-building and synthesis (e.g. writing books) are examples of such activities. Second, numerous research projects in architecture should be acceptable to the various Canadian agencies funding research. For instance, a research project involving the surveying and drawing of historically significant buildings could certainly be submitted to the Fine Arts Committee of the Social Sciences and Humanities Research Council of Canada (SSHRCC), as well as to its Canadian Studies strategic programme. All fundamental historical and critical research on architecture as a participant in human culture could be subsidized by SSHRCC. Taxonomic research, often the starting point of theory-building and explanation, of the type initiated by Durand in the nineteenth century and kept alive by Krier is in a similar situation. The more advanced forms of taxonomic projects (e. g. taxonomy as a form of explanation) carried out by the Italian school, Hillier in England, Panerai in France, and Vernez-Moudon in the USA, could be submitted to the Urban and Regional Studies committee. Just as psychology had to examine how its research realm was to be divided under the various councils, we shall have to study what types of architectural projects can be submitted to which research council, in the hope that greater development of architectural research will bring us closer to the creation of specific committees in architecture.

Third, in the present institutional context, there will remain research projects for which it will be difficult to find a funder. For instance, projects aiming at 1) the study of building types through the use of advanced knowledge, 2) systematic examination of design possibilities, and 3) post-occupancy evaluation as a means of testing design hypotheses might be supported if grounded in a discipline such as economics, psychology, anthropology, law, engineering, or computer science. Fewer such opportunities would exist when focussing on form and space or on multi-disciplinary contributions. A list of such projects could be discussed with the research councils.

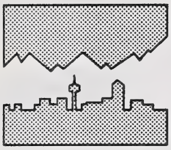
Fourth, many types of applied research can be subsidized by a host of public and private institutions, and many research enterprises can get money from a combination of sources. For instance, the acoustical laboratory at Laval University, headed by Prof. Gabriel Migneron, has grown through grant and contract support from the Natural Science and Engineering Research Council of Canada (NSERCC), Canada Mortgage and Housing Corporation (CMHC), municipalities, and ministries. Our climatology laboratory, headed by Dr. Leo Zrudlo, could rely on the same strategy, all the more since the city of Quebec now requires that all major building projects be evaluated for their impact on sun penetration in public spaces, on wind, and on snow accumulation. At the moment, no private lab in Quebec can do the job, and our lab is not able to deal with big projects because of lack of equipment. One can argue over the relevance of developing, within the university, equipment to handle projects that could be carried out by private consulting firms. However, in a university, such a lab could produce new knowledge, as well as develop design expertise from more technical studies, and eventually transfer its methodology to private firms [11]. Applied research is interesting precisely because it draws researchers and professionals closer. Often, new ways of tackling problems devised by researchers eventually become part of ordinary professional practice.

Fifth, design R and D, or the development of prototypes with respect to functional, esthetic, and technological requirements, seems to fall outside the various research categories and institutions examined up to now. It is nevertheless an essential, if underdeveloped, part of architectural research - maybe the part most useful to manufacturing and construction industries, as was argued by Professor Clipson. This domain should be the object of a particular strategy and, maybe the focus of an institute such as the one proposed by Mr. Lincourt.

To sum up, our mapping exercise shows that architectural research takes on many forms and is concerned with many questions. This state of affairs raises normal questions regarding disciplinarity and knowledge. It also indicates that, architectural research being in its infancy, architecture has not yet established a place for itself in research institutions, although many avenues are opening.

Architectural research: working toward an agenda and the means of carrying it out

During the symposium, much has been said about priorities for architectural research. Setting a research agenda would be an obvious objective for a task force on the future of architectural research in Canada. However, we also have to reflect on the ways in which priorities are set, and why so many contradictions seem to plague the relations between architecture and research - in particular the extraordinary vitality of intellectual life and the immense possibility for diversification in research, on the one hand, and the moroseness of the discourse and the very limited productivity in certain areas of architectural research, on the other.



When we discuss research priorities, issues related to subsidized research, and, even more, to contractual research, arise. There is undeniably a marketplace of research priorities: research is being demanded by society and by certain of its members, for instance, practicing architects. Messrs. Archer and Bobrow and Professor McKellar have given us fine overviews of the many opportunities in this market. The discipline of architecture is asked to respond to this demand, and, as I have already mentioned, it can even help shape this demand. There seems to be a consensus that many research areas are open to architects.

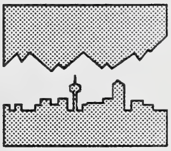
The problems facing architects seem to involve 1) training, as was pointed out by Professor Taylor, and 2) professional culture. A simple example can illustrate the problem. In Quebec, as everywhere in Canada, the renovation market is developing fast. As a result, manufacturing of building components, such as windows and doors, is mushrooming. Unfortunately, the industry is still producing components of dimensions not suited to this renovation market, with the result that old neighbourhoods are often modified, with inharmonious results. Research has been done at Laval university that should help the industry adapt to its market in simple ways [12]. There is money for that type of research, it is useful research, and it can contribute directly to the quality of the built environment. It is not glamorous and it calls for a research organization that is not present in the schools of architecture nor in the profession, and it is not part of mainstream architectural culture.

Research needs generated by the present state of knowledge in architecture (critique, interpretation, paradigm construction and evaluation) are eclipsed in this marketplace of research priorities. Yet, they are at the core of architectural culture. A look at *Design Review* indicates how "useful" and subsidized research occupies, in architecture, a secondary position by comparison with interpretation and theory. Professor Haldenby and Mr. Mertins have reminded us of the centrality of this realm. The developmental problems related to this type of research are somewhat different from those of less basic research. Here, researchers work without grants, or with the limited amounts to be found within the humanities, and rely on a particular network of institutions and media. There is no explicit social demand for this type of research, but it makes an essential contribution to our reflection on creation and culture. We would need another symposium to map the trends emerging out of this fundamental and critical research, and to circumscribe the particular problems it encounters. For the time being, I shall raise two questions regarding the foundations of architectural knowledge, both related to the question of theory building touched on earlier: their weakness as 1) a conceptual basis for architectural practice and 2) as an effective basis for architectural contributions to society.

First, architecture, with its scattered concepts and theories, seems to have difficulty developing new knowledge on the basis of knowledge already acquired, or even applying knowledge already acquired. Why is that so? Why is amnesia so frequent in architecture? For instance, recently documenting material on nursing homes and long-term care hospitals for the Quebec Association of Hospitals, I realized that the programme given to architects - a programme that had been developed carefully and with consultation - would quite often lead to the "panopticon" form, the total surveillance environment that has been decried for over a century. How can knowledge in architecture be so easily forgotten ?

Second, how does architecture make its contribution to culture and how does it participate in society's debates? When it comes to the built environment, the vast majority of managers and decision-makers are extraordinarily illiterate. For instance, when Quebec's education system was reformed during the 60's, a variety of experts were consulted on the new educational project. Architects remained in the background, even though they were to design the buildings needed to implement the reform. At the secondary level, large schools were built in order to offer more choice and flexibility to students. Had architects intervened as specialists of space, Quebec might have been spared many sterile environments that resulted by planning institutions with a human scale. Is it not startling that architects complain of the lack of attention given to their art in cultural policy, but that, at the same time, they are not particularly visible nor active in the main arenas where the built environment is determined? Do they not possess a knowledge of the built environment that could be put to work?

These questions are raised in order to underline the importance of fundamental research. Jean-Claude Marsan, with two books on the development of Montreal [13, 14], and Luc Noppen, with a major book on the architecture of Quebec City[15], have likely made the most important contribution of the past decade to the knowledge, the practice, and the public recognition of architecture in the province. Neither of them has ever had a design built.



Researchers must be sensitive to the demands of society, but they must also pursue their own insights. The profession should recognize that researchers generally have the greatest impact on architecture by being good researchers, which, at times, means by being free to define the object of their studies. In developing an agenda for research, we must keep in mind the multi-dimensionality of architecture and the need for both applied and fundamental research.

It is useless to set a research agenda, if we fail to reflect on the means of carrying it out. The questionnaire presented to the participants prior to the symposium, and many of the comments made during the symposium, seem to imply that architecture is not involved in research because it does not receive its fair share of research money. I question this assessment in order to rather look for structural explanations for this state of affairs. It is a fact that in Canada research and development is extremely underfunded. This is true for all domains of research. But is architecture, in particular, the underdog?

We have already seen that architecture has access to many research agencies, more than any other discipline, and that it could quite easily obtain funding from public institutions and private industry. So why is there so little interest in research, so little research, and such low productivity in research in the schools of architecture in this country? Do research councils deliberately neglect architecture or is there simply a lack of demand and production in architecture?

I propose the hypothesis that the state of research in architecture is closely linked to its professional culture and to its history, in particular since the 60's. Contrary to what might be expected from the vitality of intellectual life in architecture, the profession is discouraged. "What is the future of the profession?", it seems to be asking. Various studies of the profession [16-18] point out that the market for traditional architectural services is tight, and that many rank and file architects are having financial difficulties. As a consequence, many tensions exist, but they are not necessarily creative tensions. I will cite just a few of these:

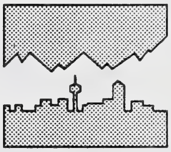
1. The traditional craft of the architect, learned through working with masters, has not kept up with the complexity of the building industry and with the complexity of society.
2. Various models of the architect are confronting each other, rather than complementing each other.
3. The market is tight, at least in the traditional trade of the architect. As has often been observed in such situations, resistance to change is a first reaction.
4. Perhaps because of the traditional self-image held by architects, the profession resists specialization and differentiation. For instance, the Barnard report has not stirred up any important debate, and the schools of architecture have yet to reform their programmes in the proposed directions.
5. The profession, as a public body, appears as a defender of the territory of the architect, rather than as an invader of new territories.

Research, highly valued in society, is currently seen as an option for architects, but it is not yet valued within the profession. It is not yet part of the definition of success. Architectural research is not understood as different and autonomous from the mission of the professional architect. The idea of research is rather new in architecture by comparison with other fields; neither the profession nor the schools have a research tradition. The means of disseminating architectural research do not even exist in Canada. There is no learned society and there are no research journals. To sum up, there is no research culture in architecture, because the means of creating one do not exist; the means of creating a research culture do not exist because there is no research culture. How can we break this "chicken and egg" situation? To develop a research culture in architecture, we must change the culture of the discipline and the profession. This means changing its values, its role models, and its institutions, a proposal that is not without risk, as was underlined by Professor Haldenby. Change should therefore be gradual.

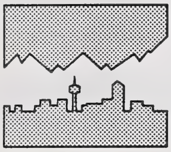
Another important structural impediment to the diversification of the profession, in particular to its involvement in research, is its very small size. Because traditional practice is regulated, there is no pressure to diversify. Little talent is left for research. France, a country which somewhat liberated access to the profession, illustrates the benefits of larger numbers: not only has French architectural design improved, but the profession has diversified and research has grown. Overlooking the impact of personnel shortages on the development of architecture may be a significant omission in Gutman's study[16]. Architecture is an extremely small profession compared with the importance of its object, the built environment. There is much more research to be done in architecture than there are people trained to do it. We should re-examine the common belief that there are too many architects. This is certainly untrue in the area of research.

Research as a social organization: finding room for architecture

Although knowledge is the property of humanity, research is much like a profession; it has its own values, convictions and institutions. Architecture has to decide whether it wants to become involved in this institution, or stand apart, at the risk of estranging itself from a powerful means of development. If we want architecture to be involved in research, we must reflect on ways in which architecture can participate in the institution while maintaining its own perspective. We must find ways to break the "chicken and egg" circle mentioned above. To be pragmatic, I propose we not attempt the risky business of changing the institution before joining it, and focus our attention on developing a "normal" research culture in architecture [19]. I shall discuss three tentative directions for change, keeping in mind that they are not the only ones: 1) the place of architecture within the universities, 2) the means of seeding a research culture via teaching, 3) strategies to invade research agencies and even create new channels for architectural research.



In recent years, the profession has had a difficult relationship with the universities. The schools at the University of British Columbia and the University of Toronto have passed through stormy years. The Lacroix report on research at Université de Montréal has drawn attention to the low research productivity of the school of architecture. At Laval University, the authorities now refuse to offer professorial appointments to practicing architects lacking academic credentials. Schools of architecture are the last point of resistance



within the universities to the development of an academic model. Engineering went through its revolution in the 19th century. Medicine, in the USA, reacted to the Flexner report by introducing a more academic training for doctors and by developing an autonomous research enterprise that has grown into a major industry. Law and architecture have trailed behind, and it seems, at least in Quebec, that architecture is even trailing behind law. The only other university-based discipline that does not yet universally require a doctorate for teaching is nursing. Should schools of architecture keep on resisting the dominant model or should they devote the same attention to research that they give to training in design?

Peter Buchanan, in an article on the state of architectural education [20], in particular on its failure to keep up with a rapidly changing building industry, proposed that academic "esoterism" be countered by the participation of practitioners and builders. This comment reminded me of a discussion we had at Laval on the hiring of builders - architects with a good practical knowledge of the trade - to teach construction, structures and mechanical systems. Are these not domains in which schools of architecture could develop research and where a sound scientific training is needed in order to compete and to be innovative? Collaboration with a researcher should certainly appeal to industry more than collaboration with the same practitioners with whom they already work. I do not mean that practitioners cannot collaborate with the schools, that they should not be involved in training; I do wonder if this collaboration would not give better returns if associated with a strong academic base.

The influence of the profession on research and education may be an important barrier to the development of architecture and to its recognition. A more independent discipline of architecture would broaden its scope, not only by opening up new avenues for architects, but also by contributing to the education of other professionals who have an impact on the environment. For instance, we all recognize how codes, rules, and norms affect the quality of the built environment; most of the time, they are produced by people who have no knowledge of the spatial patterns of human activities or of the dynamics of the physical environment. Architects could acquire the knowledge to work in this environment, and sensitize other professionals. At our school, we have created an urban design option; we offer two design courses to planners lacking a background in design. The first reaction of some colleagues to the proposal was quite insular, but what we see emerging is a new generation of planners who are conscious that the built environment has more than two-dimensions. They have a better understanding of the potential contributions of the architects at various points in the planning process.

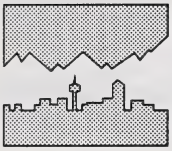
With a more autonomous mandate, the schools could broaden their main mission, the training of professional architects, to include the creation and diffusion of knowledge of the built environment. Research would grow and architectural culture would be disseminated more widely. A research culture could more easily be imparted as a part of architectural education. The survey done by Shadbolt and Carrothers [4] notes the lack of programmes of advanced study in architecture, and the necessity of creating such programmes. However, the number of applicants to graduate programmes might remain as low as it is today, unless students in first-professional degree programs are awakened to the possibilities of research. How do we reform the undergraduate level in order to develop a research culture?

There is a real dichotomy, not to say opposition, between a research culture and the dominant culture in most schools in terms of the role models commonly offered to students. Nevertheless, we must all share Professor Haldenby's anxiety in the face of the possible decomposition of the field due to a breakdown between architectural culture and practice. A serious reform of architectural education must not, for instance, diminish the development of student creativity, a primary student goal as reported by Professor Clipson.

Architecture should also infiltrate research institutions, such as research councils, industry, learned societies, and so on. The Social Sciences and Humanities Research Council of Canada has coded architecture under fine arts; this indicates that research in architecture has, in the past, grown in that direction, most probably under the influence of historians and art historians. Many other committees, such as Urban and Regional Studies and Environmental Studies, could review research projects in architecture. In order to be effective in infiltrating these organizations, we will first have to accept the general orientations of these councils and the general criteria used to define research. Once in the house in sufficient numbers, we might be able to create sections for architecture. It is useless to ask for recognition if we are unable to fulfill the expectations we create. CMHC has in the past offered great research opportunities for architects, but did they submit proposals in the amount and of the quality submitted by other disciplines?

Mr. Lincourt's project for a research centre in architecture is the kind of enterprise that can respond to the needs of the industry and give a means of developing R and D with a focus on design. Developed gradually, and with prudence, it could be successful, although the task will not be easy, people with the skills to work in such a centre being scarce. However, it would be extremely perilous to start by spending $20 million per year, considering our very limited experience in research. Why would research councils give 2 percent of their budgets to less than 2 percent of the active researchers in this country? Why should architectural research automatically receive almost 10 percent of NSERCC's annual research budget, when it has very little production to its credit ? I do not see how we could justify receiving gratuitous public money while our colleagues in other disciplines have to spend years developing research projects that are submitted to peers for evaluation. I see a confusion here between the role of public research councils and the nature of research contracts.

The worst favour that could be done to the development of research in architecture would be to give it the special privileges requested by some of us. These would only bring about bad research and, in the long run, discredit serious research in architecture, not to mention the profession. On the contrary, we should devise strategies to encourage research projects that are sound and well-grounded, but avoid any over-ambitious projects. We should be practical and accept the rigorous criteria upon which research is evaluated. We should invade the normal research networks instead of hiding in our own networks. We should also create a biannual symposium on architectural research, where all researchers in Canada would present the state of their research and where we could collectively discuss our research agenda.



To conclude, changes in values and in world views must be at the centre of our discussion. Architects have defined themselves as humanists and persons of broad knowledge, but, with the tightening of the market in recent years, the profession has become very insular and protectionist. Instead of asking for recognition for what it is, architecture should be opportunist and invade new territories. This would imply making room for tolerance and a variety of models. Research would find its place in that context. In Canada, architecture has developed as a profession. Learned architecture and research have a much thinner and shorter tradition. Their development and their dynamics could have positive effects on the profession, if only to make it known for new vistas and in new circles.

Notes

1. This past year, I had two research projects and tried, unsuccessfully, to find colleagues to take on the responsibility for three other contracts: one on design guidelines for waterfronts, one on senior citizens, and one on the architecture of Québec. This latter topic is now part of a larger contract with the City of Québec, under the direction of one of the professors of the School who had initiated the project while a member of another department.

2. Personally, I think that we have not been critical enough of our own position. Architects often want to see recognized as research that which is not the development of new knowledge and they are often unwilling to take on activities outside traditional architectural practice.

3. Popper, K.R., *La société ouverte et ses ennemis.* 1979, Pairs: Editions du Seuil.

4. Shadbolt, D., G. Carrothers, and I. Harding, *Advanced Studies and Research in Architecture: A Canadian Perspective.* 1990, Canada Council.

5. For instance, I found, through the analysis of a questionnaire sent to all architects in the province of Québec, that roughly 50 percent of the respondents focussed on the artistic side of the profession and wanted the schools to insist on design and general culture, while the other 50 percent emphasized building and technical knowledge.

6. Schon, D.A., *The Reflective Practitioner: How Professionals Think in Action.* 1982, New York: Basic Books.

7. *Oxford English Dictionary.*

8. Adamczyk, G., "L'architecture comme objet d'étude." *ARQ,* 1989. **50**: pp. 56-62.

9. French architects addressed this type of question quite comprehensively. See La recherche en architecture: un bilan inter-

national. Proceedings of the symposium: "Rencontres, Recherche, Architecture" ("Meetings, Research, Architecture"), 1986 Paris: Parentheses.

10. Aldo Rossi tried to argue for the disciplinary study of the built environment in *The Architecture of the City*, but, notwithstanding its popularity, his position has been challenged.

11. This type of research is taken up by engineers. Why not by architects? In the field of R and D, research is taken up by those who do it. Architects just have to move into the field and establish their credentials.

12. Larochelle, P., N. Neumann, and R. Chouinard, *Les composantes des facades dans l'architecture populaire des quartiers urbains anciens (The composition of facades in popular architecture in old urban districts).* 1984, École d'architecture, Université Laval, Québec.

13. Marsan, J.-C., *Montréal en evolution: Historique du développement de l'architecture at de l'environnement montréalais (Montreal evolving: a history of the development of architecture and the built environment in Montreal).* 1974, Montréal: Fides.

14. Marsan, J.-C., *Montréal: une esquisse du futur (Montreal: a sketch of the future).* 1983, Insitut québecois de recherche sur la culture (Quebec Institute for Cultural Research):

15. Noppen, L., C. Paulette, and M. Tremblay, *Québec: Trois Siecles d'architecture (Quebec: Three Centuries of Architecture).* 1979, Montréal: Libre expression.

16. Gutman, R., *Architectural Practice: A Critical Review.* 1989, Princeton, NJ: Princeton University Press.

17. Barnard, P., *L'architecture en période difficile (Architecture in A Difficult Period).* 1985, Department of Regional Economic Expansion, Government of Canada, Ottawa.

18. Blau, J.R., *Architects and Firms: A Sociological Perspective on Architectural Practice.* 1984, Cambridge, MA: MIT Press.

19. A "normal" research culture is wider than Thomas Kuhn's concept of "normal science" as described in *The Structure of Scientific Revolutions.* For instance, it includes critical research.

20. Buchanan, P., "What is Wrong with Architectural Education," in *Architectural Review.* 1989, pp. 24-26.

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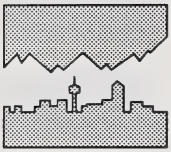

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